

3610 DGNSS RECEIVER



User Manual



Issue 2.3, February 2011

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Notice to Customers

This manual has been produced to ensure the very best performance from your SeaSTAR receiver. The manual has been clearly set out with simple instructions to ensure trouble free usage of your SeaSTAR receiver.

This publication could contain technical inaccuracies or typographical errors. Changes are periodically made to the information herein; these changes will be incorporated in new editions of the manual.

Should you require further assistance please contact the Fugro Seastar AS office.

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The equipment is marked with this pictogram.



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| REVISION HISTORY | | |
|------------------|----------------|---|
| Issue 1.0 | April 2009 | First issue |
| Issue 1.1 | May 2009 | Minor corrections |
| Issue 1.2 | November 2009 | References to G2 added. PDF version of user manual now on CD rather than USB-stick. WEEE info inserted. |
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Manual Reference: 3610 DGNSS receiver User Manual

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ACRONYMS USED IN THIS MANUAL

| | |
|------------------------|--|
| CE | Communauté Européenne |
| CEMF | Counter Electro-magnetic Force |
| C/N | Carrier to Noise ratio |
| C/N₀ | Carrier to normalised Noise ratio |
| DGPS | Differential GPS |
| DGNSS | Differential Global Navigation Satellite System |
| DHCP | Dynamic Host Configuration Protocol |
| DPS | Differential Positioning Sensor |
| EN | European Norm |
| G2 | High Precision GPS&GLONASS |
| GPS | Global Positioning System (USA) |
| GLONASS | GLObal NAvigation Satellite System (Russian) |
| HP | High Precision |
| IEC | International Electrotechnical Committee |
| IP | Internet Protocol |
| LAN | Local Area Network |
| LED | Light Emitting Diode |
| LNA | Low Noise Amplifier |
| NCC | Network Control Centre |
| NMEA | National Marine Electronics Association (Standard for interfacing marine electronic device) |
| NTRIP | Networked Transport of RTCM via Internet Protocol |
| RF | Radio Frequency |
| RoHS | Restriction of Hazardous Substances Directive |
| RTCM | Radio Technical Commissioning Maritime |
| SCF | Super Compressed Format |
| TCP | Transmission Control Protocol |
| UDP | User Datagram Protocol |
| WEEE | Waste Electrical and Electronic Equipment |
| WGS84 | World Geodetic Datum of 1984 |
| DOP | Dilution of precision |
| GGA | Global positioning system (GPS) fix data |
| VBS | Virtual Base Station |
| FTP | File Transfer Protocol |

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INTRODUCTION

This manual has been produced to assist the typical user with the installation and operation of the 3610 DGNSS receiver.

About this manual

This manual is organised into the following chapters:

- | | |
|------------|---|
| Chapter 1 | Introduction - A brief presentation of the manual and system features. |
| Chapter 2 | Getting started – Describes how to get started with the 3610 DGNSS receiver as quickly as possible. |
| Chapter 3 | Modes of operation setup – Description of the different operation modes. |
| Chapter 4 | Receiver interfaces – Describes power, antenna and serial line interfaces. |
| Chapter 5 | Menus and displays – Describes how to set up and configure the receiver. |
| Chapter 6 | 3610 DGNSS receiver and DPS setup example – Describes DGNSS receiver setup with various DPS systems. |
| Chapter 7 | Installation – A brief presentation of installation considerations and description on how to install antennas and cables. |
| Chapter 8 | Technical specifications – Describes the physical dimensions, required power, environmental restrictions and cable specifications. |
| Appendix A | Receiver service procedure |
| Appendix B | SeaSTAR receiver problem report form |
| Appendix C | Factory default settings |
| Appendix D | Menu interface layout |
| Appendix E | Diagnostic menu interface layout |

System features

The 3610 DGNSS Receiver is a component of the Fugro worldwide DGNSS Service. The Fugro service is a full-time differential GNSS (DGNSS) broadcast system delivering corrections from an array of GPS and GLONASS reference stations located around the globe. Reference stations provide industry standard formatted corrections to Network Control Centres (NCCs) at strategic geographic locations, where the corrections are decoded, checked, and repackaged in a highly efficient broadcast format. The data is modulated onto an RF carrier which is then up-converted for transmission to an L-band communications satellite.

The signals are received via the antenna/DGNSS receiver. After selection of the desired individual reference site's data set, the signals are made available as corrections for use in a GPS and GLONASS differential capable receiver.

The 3610 DGNSS receiver supports the following SeaSTAR services:

1. SeaSTAR HP
2. SeaSTAR G2
3. SeaSTAR XP
4. SeaSTAR DGNSS
5. SeaSTAR VBS

SeaSTAR HP is a decimetre level phase-based service. It is derived from the GPS L1 and L2 frequencies for centimetres. The service uses GPS phase measurements to obtain an accuracy of 10 cm horizontally (95%) and 15 cm vertically (95%). Available in Europe, America, the Middle East and Asia.

SeaSTAR G2 uses the GPS L1 and L2 frequencies in both GPS and GLONASS to compensate for ionospheric delay. The orbit/clock concept utilizes reference stations with a worldwide spread to calculate the orbit and the clock value of each GPS and GLONASS satellite more accurately than the broadcast ephemeris. Orbit and clock corrections to the broadcast ephemeris are then transmitted to the user. These corrections are valid worldwide and the distance from the nearest reference stations to the user does not affect performance.

SeaSTAR XP is a decimetre level phase-based service. It uses worldwide valid orbit/clock data that is based on GPS L1 and L2 frequencies.

This concept uses reference stations with a worldwide spread to calculate the orbit and the clock value of each GPS satellite more accurately than the broadcast GPS ephemeris. Orbit and clock corrections used to broadcast ephemeris, are then transmitted to the user. These corrections are valid worldwide and the distance from the nearest reference stations to the user does not affect performance.

SeaSTAR DGNSS is a metre level code-based service. It is based on GPS L1 and GLONASS L1 frequencies. This is similar to DGPS. Since GLONASS is not fully operational, DGLONASS has to be used together with DGPS to increase the number of available satellites in the navigation solution. Available in South America, West Africa, Europe, the Middle East and upon request in other areas.

SeaSTAR VBS (Virtual Base Station) is a metre level code-based service based on the GPS L1 frequency. VBS provides users with accurate positioning with a correction message further enhanced from their location. This multiple reference station solution can provide accuracy to within one metre. VBS provides consistent accuracy over wide areas. VBS is highly reliable since it is not dependent on any single reference station. There are no position jumps due to switching from one reference station to another. Available worldwide.

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System components

A standard delivery of the 3610 DGNSS receiver with a *spotbeam antenna* consists of the following parts:

1. 3610 DGNSS receiver unit
2. Coax cable RG-58 – N-male to N-female, 1 m
3. Coax cable RG-58 – TNC-male to N-female, 1 m
4. 2 x RS-232 serial cables LIYCY 3 x 2 x 0.14 mm², 9-pin DSub male to 9-pin DSub female, 2 m length
5. RS-422 serial cable, 9-pin DSub male to 5-pin Weidmuller female, 2 m length
6. LAN cable, shielded, 3 m length.
7. Power supply 85 VAC...265 VAC / 24 VDC / 0.75 A
8. AC power lead set, 2P, SKX/H03VVH-F, 2 x 0.75 mm², 2 m length
9. DC power lead, SKUB 2 x 0.75 mm² red (+)/black (-) with connector of type Hirose LF07WBP-6S female, 1.5 m length
10. Mounting brackets with screws. [These are mounted on the unit on delivery.]
11. CD or USB stick with this manual
12. DGNSS spotbeam antenna with brackets

A standard delivery of the 3610 DGNSS receiver for *Inmarsat* consists of the following parts:

1. 3610 DGNSS receiver unit
2. 2 x Coax cable RG-223 – N-male to TNC-male, 1 m
3. Coax cable RG-223 – N-male to TNC-female, 1 m
4. 2 x RS-232 serial cables LIYCY 3 x 2x 0.14 mm², 9-pin DSub male to 9-pin DSub female, 2 m length
5. RS-422 serial cable, 9-pin DSub male to 5-pin Weidmuller female, 2 m length
6. LAN cable, shielded, 3 m length.
7. Power supply 85 VAC...265 VAC / 24 VDC / 0.75 A
8. AC power lead set, 2P, SKX/H03VVH-F, 2 x 0.75 mm², 2 m length
9. DC power lead, SKUB 2 x 0.75 mm² red(+)/black (-) with connector of type Hirose LF07WBP-6S female, 1.5 m length
10. Mounting brackets with screws. [These are mounted on the unit on delivery.]
11. CD or USB stick with this manual

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GETTING STARTED

The purpose of this section is to get you started with the 3610 DGNSS receiver as quickly as possible.

When the receiver is supplied to you, it will be configured with default factory settings. This means that you need to configure the receiver and get a subscription before it can deliver useful corrections. In addition, you also need to connect the appropriate cables and apply power to the receiver (and antenna).

There are six buttons on the keypad; **ESC** ←, ↑, ↓, → and ↵ (Enter) (see figure 5). The ↵ button is used to confirm user input and settings. It is also used to select a page. The **ESC** button is used to exit pages without changing settings, while the arrow buttons are used to turn pages and to set parameters.

Initial setup



Figure 1. Rear View of 3610 DGNSS receiver

1. Install the DGNSS antenna in such a way that it has a clear view of the sky in the direction of the satellite (see also page 25). Refer to the NCC in your region for an azimuth/elevation chart for the satellite service you have subscribed to.
2. Connect the DGNSS antenna cable between the DGNSS antenna and the 3610 DGNSS receiver (ANT connector at rear panel).
3. Connect the power cable to a suitable 9-24 VDC power supply. Check correct polarity. This will power on the unit. We recommend using the supplied power supply.
4. Configure the 3610 DGNSS receiver to acquire the DGNSS signal. This can be done in the following ways:
 - a). By selecting the service directly in the **Set Pos/Ch** menu (see page 16) or
 - b). By entering the frequency and symbol rate directly into the **Set Pos/Ch** menu (see page 16).

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The receiver will indicate frequency searching by displaying "Init" on the signal status page. When it has locked to the signal, "Sync" and finally "Lock" will be displayed. Signal strength will also be indicated by a bar graph display and C/N ratio. Should the "Lock" indicator fail to be displayed after 30 – 90 seconds, check through steps 1 to 4 above. Acquiring lock for the first time can take longer time if the broadcast station and satellite list are updated between production date and initial setup.

5. Make sure you have a valid subscription. If you need any support on the subscription, the contact info is:

SeaSTAR Customer Support and 24 Hour Help Line

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Tel: +47 21 50 14 20

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E-Mail: seastarservice@fugro.no

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MODES OF OPERATION SETUP

Set the receiver to the required mode; DGNSS, HP/XP/G2 or VBS.

Note! *During certain situations it may take up to 40 min before normal operation is achieved with regard to output of correctional data. Reasons for this include:*

- *First time power-up.*
- *The unit has been moved for a longer distance without having GPS track.*
- *Without power for a longer period of time.*

DGNSS mode setup

- In DGNSS mode, the RTCM data will be available from the output ports A and/or B or LAN.
- In DGNSS mode, the GPS L1 output must be enabled. In addition, the GLO L1 output and Iono output could be enabled if GLONASS corrections and/or ionospheric corrections shall be used.

HP/XP/G2 mode setup

- In HP/XP/G2 mode, the HP/XP/G2 data will be available from output ports A and/or B or LAN. Default port settings are initially configured, and will by default change based upon the type of subscription. If different port settings are needed, the ports will need to be set up to match the requirements of your GPS receiver HP/XP/G2 ports. The **Port Cfg** menu item must then be used to set these parameters (see page 17).
- In HP/XP/G2 mode the HP/XP/G2 output must be enabled.

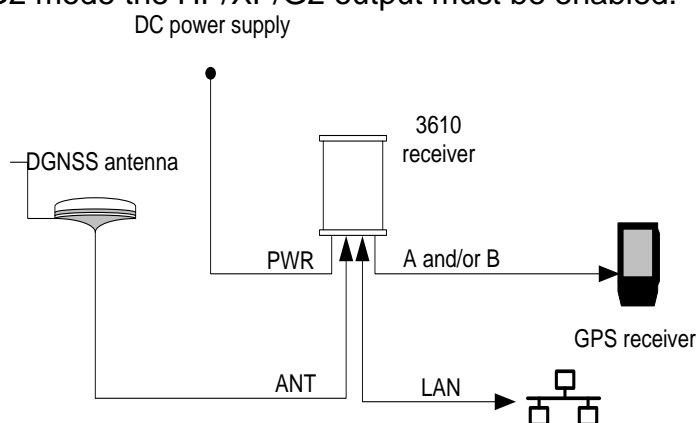


Figure 2. Operating in DGNSS or HP/XP mode

VBS mode setup

In VBS mode a composite set of RTCM corrections is computed from the GPS network data sent over the link. The following information is required to compute these corrections; time (supplied via the link), GPS almanac data (supplied via the

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link), and receiver location entered via the display configuration menu or through the GGA message via a GPS receiver.

- In VBS mode, the RTCM data will appear on the output ports A and/or B or LAN. Default port settings are initially configured, and will by default change based upon the type of subscription. If different port settings are needed, the ports will need to be set up to match the requirements of your GPS receiver RTCM ports. The **Port Cfg** menu item must then be used to set these parameters (see page 17).
- For the VBS operation, the 3610 DGNSS receiver needs to be supplied with a position for the area of operation. Insert the position via the **Set Pos/Ch** menu (see page 16), or from a GGA message input at port A and/or port B.
- In VBS mode, the VBS output must be enabled.

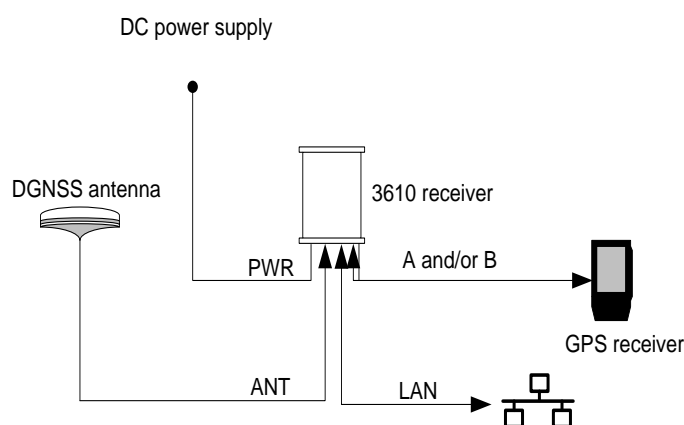


Figure 3. Operating in VBS mode

RECEIVER INTERFACES

Power

The 3610 DGNSS receiver will operate on any DC voltage between 9 VDC and 24 VDC. When operational, the unit dissipates typical 9 W (max 12 W) of power.

Power is connected to the unit via a 1.5 metre long red/black lead. The cable is terminated with a 6-pin Hirose LF07WBP-6S female connector. Red is +Vin and black is -Vin.

The connector pin layout is illustrated in Figure 4. Left is as viewed from the female mating side, and right is solder side.

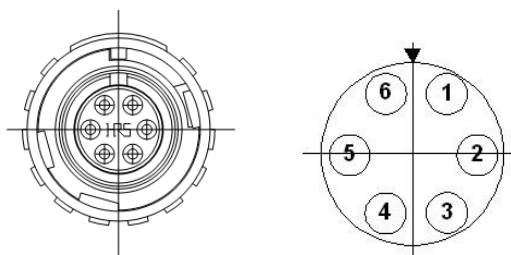


Figure 4. Pin layout of Hirose LF07WBP-6S female connector

The connector has the pin layout as described below:

| Pin no. | Signal |
|---------|-----------------------|
| 1 | GND (Service only) |
| 2 | PPS_IN (Service only) |
| 3 | -Vin |
| 4 | -Vin |
| 5 | +Vin |
| 6 | +Vin |

Table 1 Power connector pin layout

Antenna

Antenna connection is made via a low loss 50-Ohm coaxial cable (RG-223), which is terminated with a standard 50-Ohm male N-type connector.

The DGNSS spotbeam antenna has an internal LNA (low noise amplifier), which is powered by +12 VDC. The antenna can be supplied either by external power or powered from the 3610 DGNSS receiver power (see page 16). If you use external power, make sure to attach DC-block between the external power and the 3610 DGNSS receiver ANT connector.

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Serial lines

The panel connectors for serial port A and B are DB9 female. Pin layout is described below:

| Pin no. | Signal |
|---------|------------|
| 1 | RS-422 TX+ |
| 2 | RS-232 TXD |
| 3 | RS-232 RXD |
| 4 | Not in use |
| 5 | GND |
| 6 | RS-422 TX- |
| 7 | Not in use |
| 8 | RS-422 RX+ |
| 9 | RS-422 RX- |

Table 2 Serial line pin layout

Special serial cables are supplied with the DGNSS receiver. The cables are terminated as described below.

| DB9 male Pin number | 2 metre cable | DB9 female Pin number |
|------------------------|---------------|--------------------------|
| 2 | ----- | 2 |
| 3 | ----- | 3 |
| 5 | ----- | 5 |

Table 3 RS-232 data cable layout

| DB9 male Pin number | 2 metre cable | Weidmuller female Pin number |
|------------------------|---------------|------------------------------------|
| 1 | ----- | 2 |
| 6 | ----- | 1 |
| 8 | ----- | 5 |
| 9 | ----- | 4 |
| 5 | ----- | 3 |

Table 4 RS-422 data cable layout

Note! *Do not use standard RS-232/ RS-422 cables*

Note! Serial port settings depending on subscription type

By default the automatic port settings based on subscription type is set to on. Any manual changes in the port settings, will disable the automatic port configuration based on subscription type.

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The table below describes the automatic serial port configuration, depending on the type of subscription:

| Subscription type | Serial port A | Serial port B |
|-------------------|---------------|---------------|
| H : HP | | X |
| L : L1 | X | |
| I : IONO | X | |
| G : GLONASS | X | |
| V : VBS | X | |
| R : RAW (SCF) | | X |

UDP ports

The Ethernet connector is a standard RJ45 Ethernet connector with two LEDs. Shielded Ethernet cables can be used to connect to this port.

The Ethernet interface provides the possibility to send corrections on four different UDP ports.

Default port numbers are:

A: 31100

B : 31110

C : 31120

D : 31130

Default UDP Net Mask is:

: 192.168.000.255

The UDP port mask must be configured to match the Ethernet to which it is connected to. Activation of the ports to be used must also be configured, by default all UDP ports are set to off. Type of correction output on the UDP ports is configured in the **Port Cfg** menu, under each UDP port.

MENUS AND DISPLAYS

General

The 3610 DGNSS receiver has an internal display with two lines x 16 characters. There are six buttons on the keypad; **ESC**, ←, ↑, ↓, → and ↵ (Enter).

The ↵ button is used to confirm user input and settings. It is also used to select a page. The **ESC** button is used to exit pages without changing settings, while the Arrow buttons are used to turn pages and to set parameters.

Pressing the **ESC** and ↵ buttons simultaneously for at least three seconds will reboot the receiver.

There are two LED indicators on the 3610 DGNSS receiver, one green and one red. The green LED indicator is lit when the unit is powered on. The red LED indicator is lit or flashes when the 3610 DGNSS receiver unit has an alarm situation.



Figure 5. The 3610 DGNSS receiver front panel

There are seven main pages in the 3610 DGNSS receiver menu structure: **Status** menu, **Set Pos/Ch** menu, **Port Cfg** menu, **Set GPS Sites** menu, **Set GLO Sites** menu, **Display Cfg** menu and **About** menu. In addition to the main pages, a **Signal status** page (top level page) is displayed.

When the 3610 DGNSS receiver unit starts, the **Signal status** page is displayed showing indication of signal strength, satellite name and lock status.

On the display pages there are arrow indicators at the bottom right side of the display. The arrows indicate the possibility to turn pages up or down.

| | |
|----------------------------------|----|
| Possible to turn page up or down | ◀▶ |
| Possible to turn page down | ▼ |
| Possible to turn page up | ▲ |
| Step into sub-menu | ▶ |

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Alarm situations

The 3610 DGNSS receiver has two LED indicators, one green for power indication and one red for alarm indication. The red LED will be lit continuously or flash if one of the situations below arises. The LED will be turned off if the situation which activated the alarm becomes OK, for example if lock on signal, upgrade of software is finished. The alarm situation will, however, be stored in the **Status** menu.

| Criteria | LED characteristics | Text displayed |
|--|------------------------------|-----------------|
| No lock on signal | Continuous red | No lock |
| During software upgrade | Flashing at $\frac{1}{3}$ Hz | |
| Antenna voltage failure, output voltage to the antenna drops | Flashing at $\frac{1}{2}$ Hz | Voltage failure |
| Not subscribed | Flashing at $\frac{1}{2}$ Hz | Not subscribed |

The user must acknowledge the alarm on the display by pressing **ESC** before the alarm text disappears and the LED is turned off. The display will return to the page it displayed before the alarm text was displayed.

If an alarm arises, but the situation becomes OK before the alarm is acknowledged on the display, there is a timeout on the display so the alarm text disappears after three minutes and returns to the page it displayed before the alarm was activated. The LED will, however, continue to flash until pressing **ESC**.

Main pages

Signal status

The **Signal status** page is the top page in the 3610 DGNSS receiver. This page is displayed after start up, and is at the top level of the menu structure.

About

From the **About** menu it is possible to read receiver type, serial number, software version and subscription expiry date. It is also possible to reset receiver and select factory default. No configurations from these pages are possible.

Status

From the **Status** menu it is possible to read channel and position status, alarm status, port status and the antenna output voltage. No configurations from these pages are possible. From the Alarm sub menu it is possible to see the list of previous alarms.

Set position/channel

From the **Set Pos/Ch** menu it is possible to configure frequency, symbol rate, which service to use and to set position. In addition, it is possible to set the antenna output power on or off (12 VDC).

Port configuration

From the **Port Cfg** menu it is possible to configure the communication ports in the 3610 DGNSS receiver. The receiver has two serial ports, Port A and Port B and LAN.

Set GPS L1 Sites

From the **Set GPS Sites** menu it is possible to select which GPS L1 reference sites to use.

Set GLONASS L1 Sites

From the **Set GLO Sites** menu it is possible to select which GLONASS L1 reference sites to use.

Display configuration

From the **Display Cfg** menu it is possible to configure the contrast and backlight on the receiver display.

Backup configuration

From the **Backup cfg** menu it is possible to save and restore user configurations.

Signal status

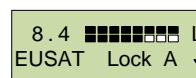
The **Signal status** page for the 3610 DGNSS receiver indicates signal strength, which satellite the receiver is set to, the lock criteria and available subscriptions.

After power on, the receiver will begin to search for a DGNSS satellite. "Init" will be displayed at the bottom right of the screen when the receiver is in search mode. When the receiver locks to a signal, "Lock" will be displayed instead. If a signal is lost after being locked, "Sync" will be displayed.

- "Init" : No lock has been acquired since startup or change of channel settings.
- "Sync" : No lock has been acquired since last loss of lock.
- "Lock" : Lock is acquired and correct corrections are being output on the port A and/or port B or the LAN port, depending on the port configuration.

A signal strength number, C/N, will be shown in the top left of the screen together with filled bars when the receiver locks.

The changing between "L" and "I" at the top right indicates that the demodulator is locked to the L-band signal. The changing between "N" and "n" at the top right indicates that the demodulator is locked via NTRIP. Changing between "p" and "P" at the top right indicates that a GGA message is applied.

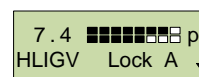


Note! If "Lock" does not appear, check frequency and symbol rate in the **Set Pos/Ch** menu and make sure the antenna is connected and powered, with a clear view of the sky.

| Bars filled | C/N |
|-------------|-----------|
| No bars | <1.0 |
| 1 bar | 1.0 – 1.5 |
| 2 bars | 1.5 – 2.0 |
| 3 bars | 2.0 – 3.0 |
| 4 bars | 3.0 – 4.0 |
| 5 bars | 4.0 – 5.0 |
| 6 bars | 5.0 – 6.0 |
| 7 bars | 6.0 – 7.0 |
| 8 bars | > 7.0 |

At the bottom left, the text alternates between showing configured satellite and available subscriptions. The subscription indications are as follows:

H : HP
L : L1



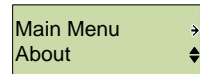
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I : IONO
G : GLONASS
V : VBS
R : RAW (SCF)

About

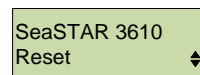
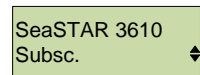
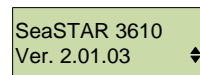
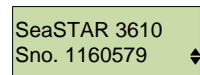
When pressing arrow down in the **Signal status** page, the **Main** menu with its main pages appears.

The **About** menu shows information about the 3610 DGNSS receiver. The DGNSS receiver type, serial number and software version are displayed.



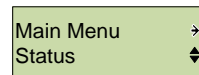
In addition, the subscription expiry date of the DGNSS service is displayed.

The serial number (Sno) of the unit is important when contacting Fugro SeaSTAR for subscription requests.

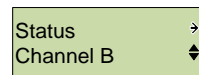
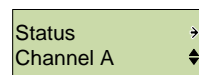


Status

When pressing the **Enter** or the → button from the the **Status** menu, the channel status, NTRIP, VBS, Alarms, Position status, GPS time, corrections output and Antenna power on/off are displayed.

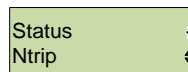


The **Channel status** page displays DGNSS satellite status. When selecting a channel status page and using the ↑ and ↓ buttons to toggle up and down, the satellite ID, service ID, actual frequency, symbol rate, Uplink status, good and bad counts, last lock time, C/N and C/N₀ are displayed. The good and bad counts percentages are displayed from the last 5 minutes of samples.

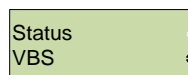


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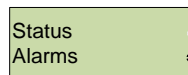
The **NTRIP** page displays if the NTRIP is active or not, the NTRIP IP address, the NTRIP port and the NTRIP mountpoint (satellite).



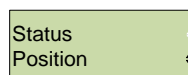
The **VBS** page displays if an input from an external GPS receiver is available, and the status of the input data. Information available is the quality of the service: Q1 (GPS) or Q2 (DGPS), number of satellites, DOP, data age of the corrections and the latitude/longitude values that are input.



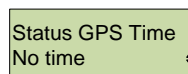
From the **Alarms** page current and/or previous alarm situations can be accessed.



Selecting the **Position** status page displays the position input by the user. If no position is input, --- is displayed.

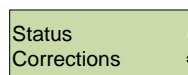


The **Status GPS Time** menu gives the current date and time received from the satellite.



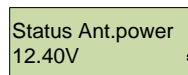
The **Corrections** menu shows on which ports the different correction formats are set up. The following status could be shown:

- sAB meaning serial port A and B
- uABCD meaning UDP port A, B, C and D.



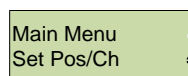
Combinations of these such as sA uBD, could also be shown according to the port configuration settings.

The **Ant.power** displays if the antenna voltage is turned on or off.

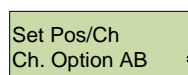


Set position/channel

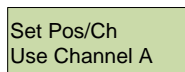
When pressing the **Enter** or the → button from the **Set Pos/Ch** menu, the channel option, used channel, channel settings, NTRIP, position settings and antenna power on/off settings are displayed.



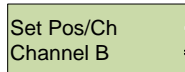
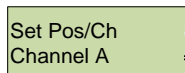
The **Ch. Option** menu makes it possible to select channel A, B or both channel A and B as Lband sources. If both channel A and B are selected, this will include automatic switching between the two channels based on the C/N, and the quality of the signals. Lost lock on one channel will force a switching to the other channel, if good data are received on this channel. Correction data will only be transmitted for the current channel. The frequency difference between channel A and channel B is limited by 10 MHz. If channel A and channel B are separated by more than 10 MHz, lock might not be obtained.



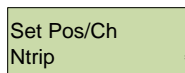
The **Use Channel** menu makes it possible to select which channel to use, if both channel A and channel B are selected in the **Ch. Option** menu.



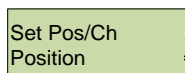
From the **Channel** page it is possible to set the satellite service, frequency and symbol rate. Note that the satellite service choice will not be available before a satellite list is downloaded.



From the **NTRIP** page it is possible to set NTRIP enable/disable, IP-address to server, user name and password.



From the **Position** page it is possible to manually set the latitude and longitude. Press \leftarrow to enter selection mode. Press \leftarrow and \rightarrow to move to correct digit and press \downarrow and \uparrow to change the numbers. Press \leftarrow to save the change.



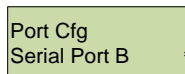
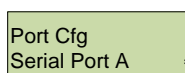
Position
N 11°11.1111' E 22°22.2222'
is converted to
LAT 1111.1111N LON 2222.2222E

From the last sub-menu you can set the antenna power on/off.

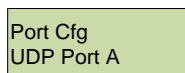
Port configuration menu

When pressing the **Enter** or the \rightarrow button from the **Port Cfg** menu, the serial, UDP, TCP and FTP port settings are displayed.

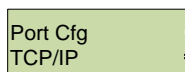
From the **Serial Port A** and **Serial Port B** pages you can access the port baud rate, GPS enable/disable, VBS enable/disable, HP/XP/G2 enable/disable, GLO enable/disable, IONO enable/disable, RAW (SCF) enable/disable and Debug enable/disable. If there is no subscription to these services, "No Subsc" will be displayed.



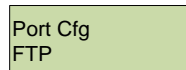
From the **UDP port A**, **UDP port B**, **UDP port C** and **UDP port D** menus the port mask, port number and the activation of the port is selected. It is also possible to select GPS enable/disable, VBS enable/disable, HP/XP/G2 enable/disable, GLO enable/disable, IONO enable/disable, RAW (SCF) enable/disable and Debug enable/disable. If there is no subscription to these services, "No Subsc" will be displayed.



From the **TCP/IP** menu DHCP can be set to on/off. Under menu item **set static** the IP address, IP netmask and IP gateway can be set. The IP address and IP MAC address can also be displayed under this menu.

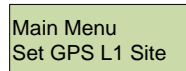


From the **FTP** menu it is possible to configure FTP user name and FTP password.



Set GPS L1 sites menu

From this menu the GPS L1 reference stations which shall be output, are set. These settings are only in use when a GPS L1 subscription is enabled.

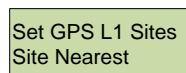


Note! The site list containing the reference stations must be available from the satellite before the stations are shown. If they are not available, "No station list" will be shown. The list will not be available if there is no, or never have been, GPS L1 subscription available.

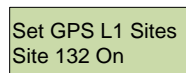
The following options may be selected:

- On/off/nearest

It is possible to set all GPS L1 sites on or off, to use the n nearest stations or manually to set individual sites on or off. How many of the nearest stations to use, is configurable. Factory default value is 32. When using the nearest sites option, it is important to insert the position into the receiver. The position is set in the **Set Pos/Ch** menu, or through port A or B from a GGA message.



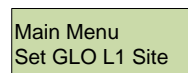
When setting all GPS L1 sites on or off, it is possible to manually set which sites to use or not use. The reference station sites are all received on the air and stored in the receiver.



Use the ↑ and ↓ buttons to view the available reference stations. Press the ↵ button to be able to change the setting. Use the ↑ and ↓ buttons to select the setting and press ↵ to save the setting.

Set GLO L1 sites menu

From this menu the GLO L1 reference stations which shall be output, are set. These settings are only in use when a GPS L1 and GLO L1 subscription is enabled.

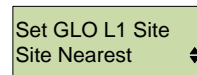


Note! The site list containing the reference stations must be available from the satellite before the stations are shown. If they are not available, "No station list" will be shown. The list will not be available if there is, or never have been, any GLO L1 subscription available.

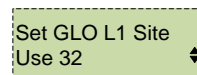
The following options may be selected:

- On/off/nearest

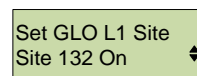
It is possible to set all GLO L1 sites on or off, or only to use the nearest stations. How many of the nearest stations to use, is configurable. Factory default value is 32. When using the nearest sites option, it is important to insert the position into the receiver. The position is set in the **Set Pos/Ch** menu, or through port A or B as a GGA message.



When setting all GLO L1 sites on or off, it is possible to manually set which sites to use or not use. The reference station sites are all received on the air and stored in the receiver.

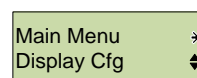


Use the ↑ and ↓ buttons to view the available reference stations. Press the ← button to be able to change the setting. Use the ↑ and ↓ buttons to select the setting and press ← to save the setting.

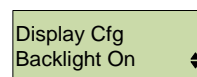


Display configuration menu

From the **Display Cfg** menu it is possible to change contrast and enable or disable backlight on the display.

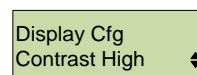


The **Backlight On** menu simply switches the display backlight on or off.



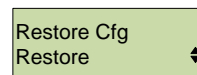
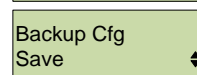
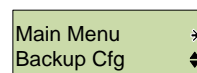
The **Contrast** menu has three choices for the display contrast:

- High
- Medium
- Low



Backup configuration

The **Backup Cfg** menu makes it possible to store the current configuration for port settings and corrections settings, with the **Save** submenu. If lost, the stored configuration can then be easily restored by selecting the **Restore** submenu.



Note! *Restore is only possible if user configurations have been previously saved. It will also reset the receiver.*

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3610 DGNSS RECEIVER AND DPS SETUP EXAMPLE

The 3610 DGNSS receiver may be used together with a variety of DPS systems: DPS 116, DPS 122, DPS 132, DPS 200, DPS 232 and DPS 700. The different DPS systems use different SeaSTAR services:

| DPS system | SeaSTAR DGNSS | SeaSTAR Plus | SeaSTAR HP | SeaSTAR XP | SeaSTAR G2 |
|------------|---------------|--------------|------------|------------|------------|
| DPS 116 | X | | | | |
| DPS 122 | X | | | | |
| DPS 132 | X | X | X | X | |
| DPS 200 | X | | | | |
| DPS 232 | X | X | X | X | X |
| DPS 700 | X | X | X | X | X |

To set up a DPS system to use Fugro SeaSTAR services do the following:

1. Connect the receiver and DPS as described in Figure 6. below:

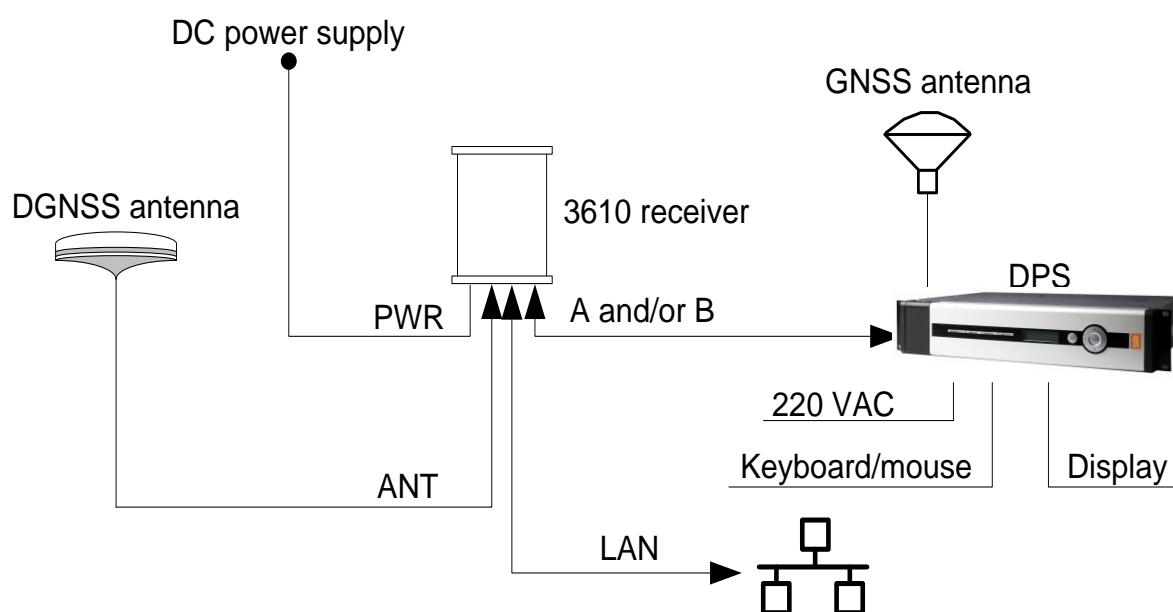


Figure 6. DGNSS receiver and DPS connection

2. Power on the units. The DPS will start automatically.
3. In the DPS, select **System|Change system mode**. Select **Configuration**. A dialog which requires a password will open. The password is "stx".

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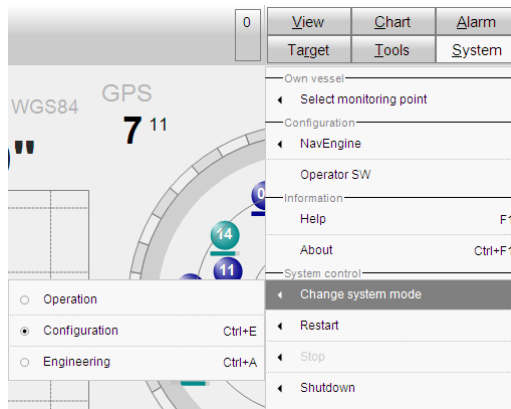


Figure 1 Entering the DPS setup file

4. Select **System|NavEngine standard**.
5. The figure below displays a default view for the Input/Output communication before any interface details are added.

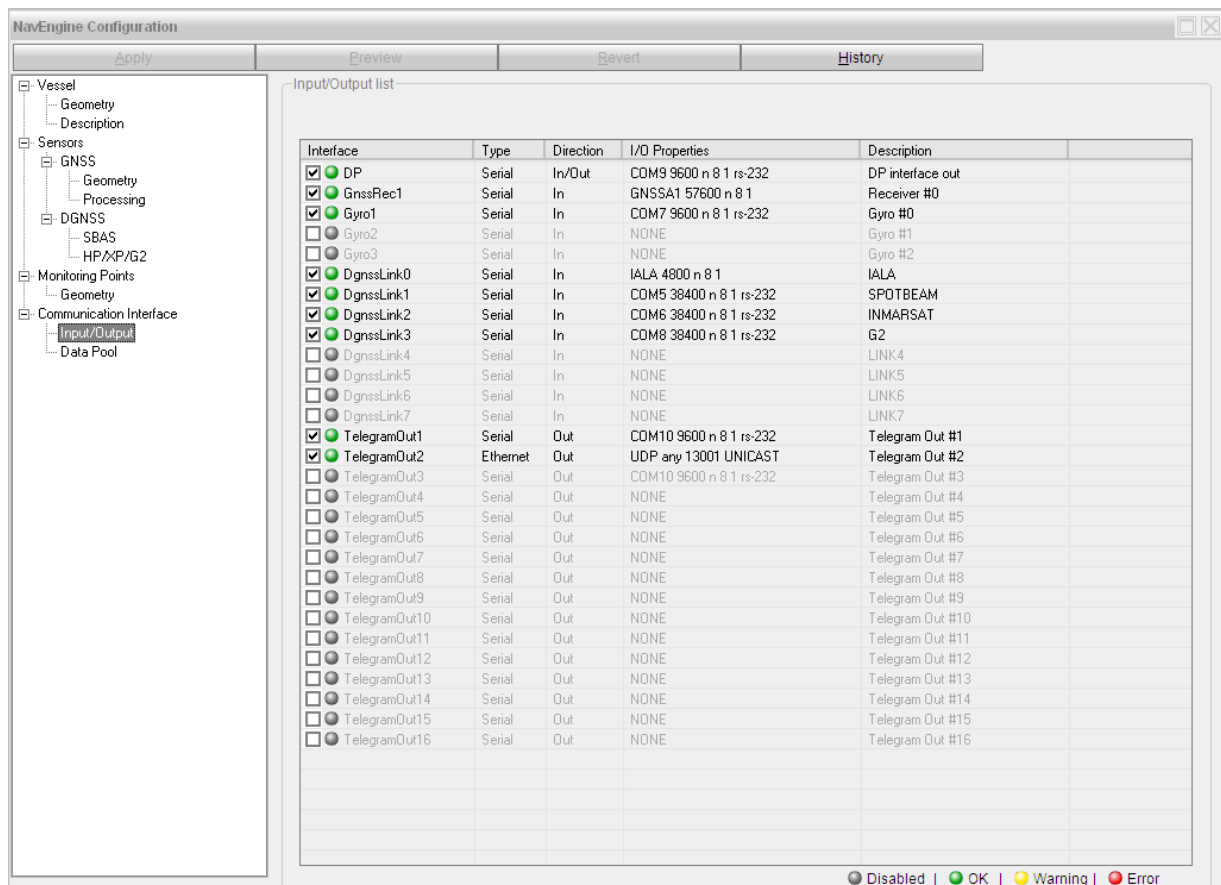


Figure 2 Input/Output view before interface details are added

6. Select a DGNSS link and configure the I/O type to match with the output of the 3610 Demodulator. It is possible to define several correction links in the DPS and the 3610 Demodulator system. The links can be set up to decode RTCM or HP/XP/G2.

7. When selecting an interface, the Input/Output view will be divided into two sections. The upper part consists of the list with all interfaces. The lower part consists of **Configuration details** for the interface selected in the list. The configuration details vary between the different interfaces.

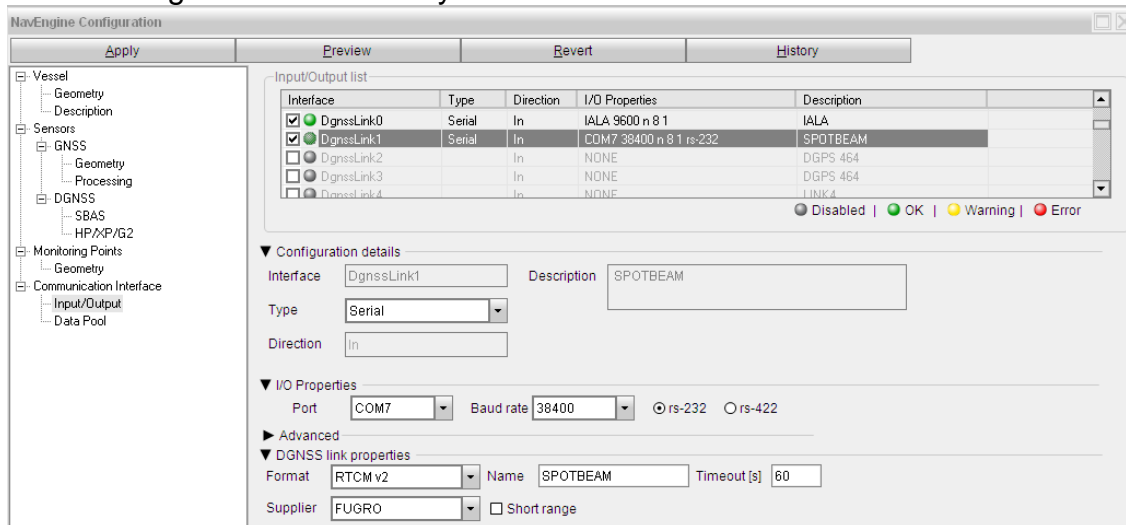


Figure 3 Input/Output list view with configuration details

8. The Configuration details view is the lower part of the Input/Output list view. The Configuration details view is divided into two sections: an interface selection section and an I/O Properties section.

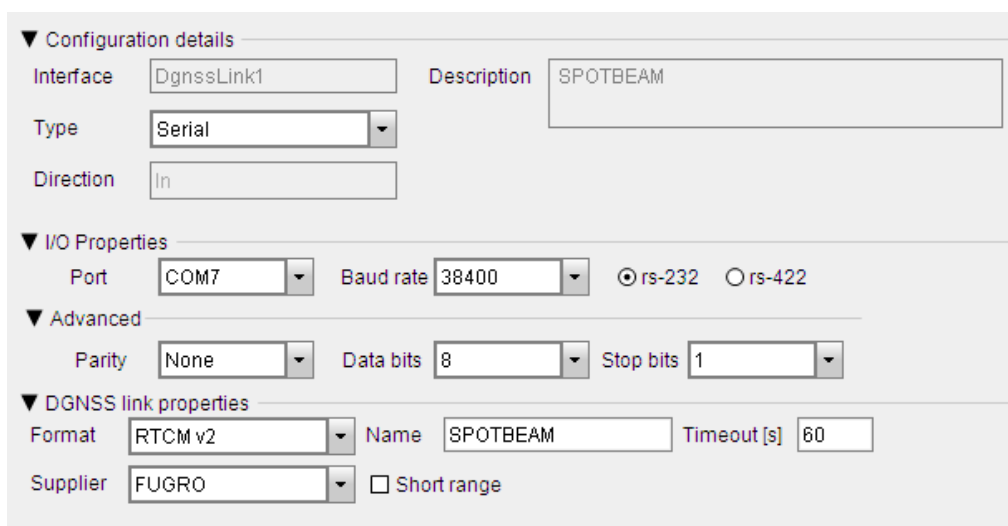


Figure 4 Configuration details view

9. To change the settings, press the **Apply** button in the upper left corner. Changes are automatically saved and applied.
10. Exit the configuration menu.
11. When the DPS is configured, make sure the configuration of the 3610 DGNSS receiver agrees with the DPS configuration with regards to baud rate and RS-232/RS-422 interface and cables.

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Note! *When planning to use HP/XP/G2 corrections, the DPS must be set up and connected to the 3610 DGNSS receiver when the subscription is transmitted and enabled.*

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INSTALLATION

Installation considerations

Before starting installation of the 3610 DGNSS receiver on a vessel, the following should be considered:

- Determine the preferred location for each unit. The 3610 DGNSS receiver is designed for indoor installation. Consider cable length, connector attachment space (cable bend radius), stowing of excess cable, moisture, chemical corrosion, vibration and heat exposure.
- Before drilling holes, consider using existing hardware and locations where equipment has been previously installed. Avoid drilling holes that may damage other equipment (e.g. structural frame members, electrical cables or fluid lines).
- High vibration and high temperature locations should be avoided whenever possible.
- In applications where vibration exceeds 4Gs acceleration, shock mounts are required. Refer to Customer support for mounting recommendations.
- All connections to the unit are at the rear side and available space for cable connections and service must be provided.
- When using dual/multiple 3610 DGNSS receivers, it is recommended to set the different demodulators to ch.option A. The different 3610 DGNSS receivers should then be set up to track different satellites, to obtain the redundancy by using dual/multiple 3610 DGNSS receivers. This is only a general recommendation, and specific set up considerations must be obtained on each installation by skilled personnel.

DGNSS antenna location

Antenna positioning is critical to system performance. The following conditions must be met for optimum system performance:

- The antenna must be mounted at least 1.5 metres away from transmitting antenna of any frequency. Closer positioning may cause overloading of the receiver RF circuits.
- The antenna should be mounted at the highest point that will give a good view of the horizon and be as level as possible.

Cable installation

Cables must be correctly installed for optimum system operation. Therefore, the following should be noted:

- Recommended cable type is: 1/2" CELLFLEX® Superflexible Foam-Dielectric Coaxial Cable (SCF12-50JFN) or equivalent.
- If possible, do not run L-Band receiver antenna cables parallel to other radio system cabling closer than 30 centimetres.

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- If cables must cross, ensure that they cross at an angle of 90°. This minimizes the possibility of interference.
- As far as is practicable, ensure that cables and I/O connectors are unique and fit only in their allocated location.
- Try to make the coaxial cables as short as possible.
- Avoid routing cables along-side power generator cabling and other high electrical noise sources. This can cause interference.
- Do not kink or force cables into sharp bends that may damage the cables and cause system failure.
- After installation, ensure that excess cable is looped and clamped or tied safely away from any control cables, fuel lines, hydraulic lines or moving parts. When stowing over-length cables, form loops of no less than 150 mm minimum cable bend radius.
- Cable routing must avoid high temperature exposure (e.g. exhaust manifold).

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TECHNICAL SPECIFICATIONS

Radio frequencies

Receiver frequency band: 1525 – 1559 MHz
 Channel bandwidth: 5 kHz

Physical dimensions

Width: 109.5 mm
 Height: 65 mm
 Depth: 253 mm
 Weight: 0.8 kg
 Colour housing: Clear anodizing

Power

Voltage: 9-24 VDC
 Power consumption: < 16 W

Environmental specifications

Enclosure material: Aluminium
 Enclosure protection: IP-22
 Operating temperature range: -5 to +55 °C
 Recommended operating temperature range: +20 to +25 °C
 Operating humidity: Max.95% non-condensing
 Storage temperature range: -20 to +65 °C
 Storage humidity: Less than 55%

Connectors

RF input to receiver: TNC female
 Power connector: Hirose LF07WBR-6P male
 Ethernet connector: RJ45
 Serial connectors: 9-pin DSub female

Cables

Coax cables: 1/2" CELLFLEX® Superflexible (SCF12-50JFN)
 Serial cables: RS-232 LIYCY 3 x 2 x 0.14 mm², RS-422
 Power cable: SKUB 2 x 0.75 mm²

Compass safe distance

Steering magnetic compass: 0.2 m
 Standard compass: 0.4 m

Data input and output

Two serial ports: A and B
 Four UDP ports: A, B, C and D
 Electrical interfaces: RS-232 and RS-422
 Baud rates: 2400 – 115 200
 Serial data format: N, 8, 1

IP interface

Protocol support: NTRIP, FTP, UDP, TCP

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APPENDIX A

Receiver service procedure

If a SeaSTAR receiver unit fails to perform, contact Fugro Seastar AS, after following the procedural checks. We wish to hear about frequently experienced problems and your assistance will be appreciated. Copy the form on the next page, fill in the details requested and faxing or mailing the form to Fugro Seastar AS for forwarding to Product Marketing.

The most common problems are interfacing, and usually occur at installation time. If you have an interfacing connection not covered in this manual we would like to assist you and produce another technical bulletin that may assist other users in the future.

If a problem appears that you think may be caused by a system performance problem, contact the Seastar Support (seastarservice@fugro.no) and inform of any system aberrations that may have been experienced.

We are sensitive to our customers' needs and we want to assure specified system performance at all times. There could, however, be situations where conditions are below par, such as fringe area operations, radio communication disturbance etc., and, as a SeaSTAR receiver monitors the system performance continuously, these conditions would be noted.

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APPENDIX B

SeaSTAR receiver problem report form

Please copy this form and report the problem with as much detail as possible.

| | | |
|---|--|--------------------------|
| Problem with: Signal Y/N Manual Y/N SeaSTAR Y/N Receiver Y/N | | Date: |
| Description of problem: | | |
| | | |
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| | | |
| | | |
| | | |
| | | |
| Person Reporting: | | Contact Phone #: |
| Model #: | | Serial #: |
| Customer Name: | | Customer Address: |
| Customer Phone #: | | |
| Date purchased: | | Dealer: |
| / | | |
| GPS Receiver used: | | Serial #: |
| Area of operations: | | |
| Symptoms from display (if any): | | |

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APPENDIX C

Factory Default settings

Position

Lat : 5955.000000
Lon : 1038.000000

Satellite

Channel A

Name : EUSAT
Frequency : 1537440000
SymbolRate : 2438

Channel B

Name : AOREH
Frequency : 1535125000
SymbolRate : 1219

Sites

GPS : 32 Nearest
GLONASS : 32 Nearest

Antenna

Antenna power : Off

Serial Ports

A : 38400 baud
B : 38400 baud

TCP/IP

Address : 192.168.004.100
NetMask : 255.255.255.000
Gateway : 192.000.000.001
UseDHCP : No
Port A : 31140
Port A : 31141
Port A : 31142
Port B : 31143

UDP Ports

A : 31100
B : 31110
C : 31120
D : 31130
NetMask : 192.168.000.255

NTRIP

Option : Off
ServerAddress : 150.101.173.014
Port : 2101
Mountpoint : EUSat
Username : <get from Fugro>
Password : <get from Fugro>

FTP

Username : stx
Password : stx

Display

Backlight : On
Contrast : High

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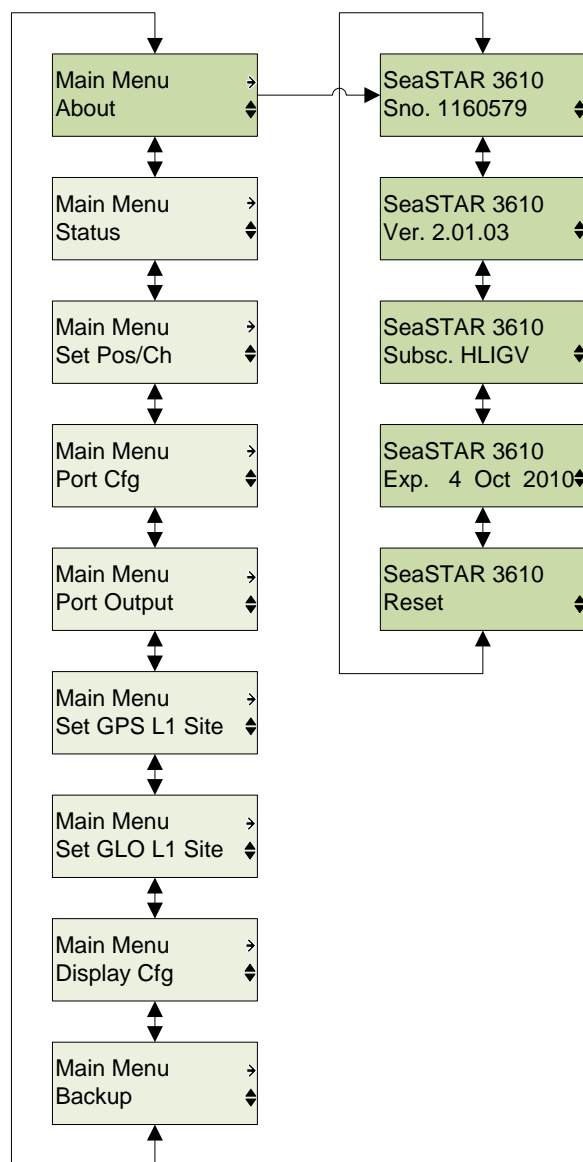
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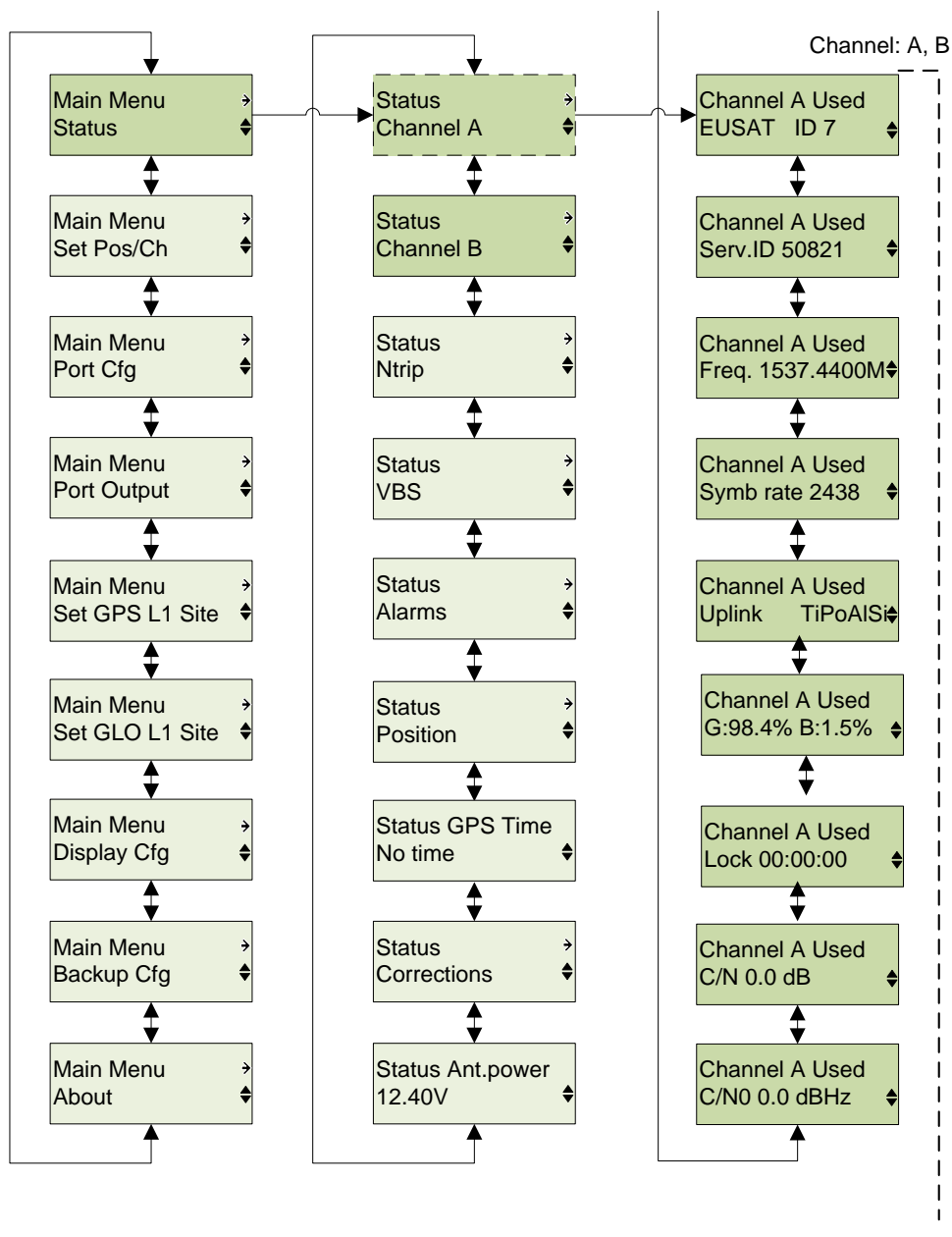
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APPENDIX E - MENU STRUCTURE

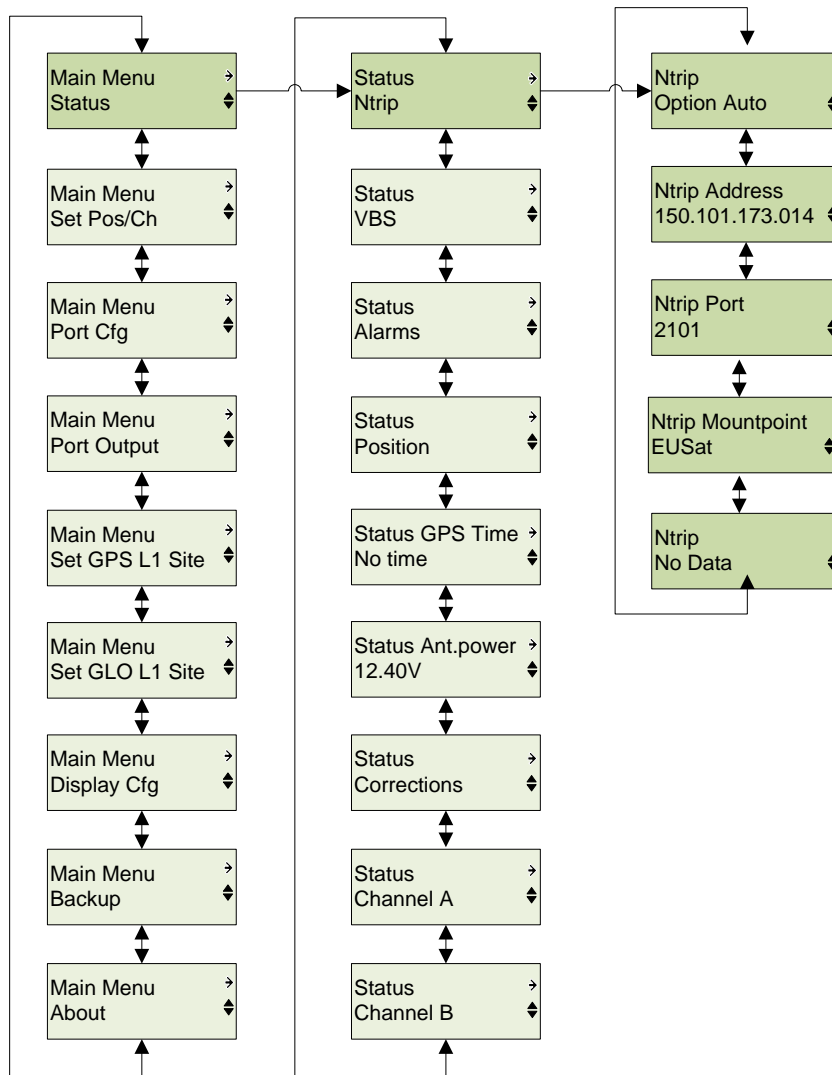
This section describes the menu structure in the 3610 DGNSS Receiver.

About menu





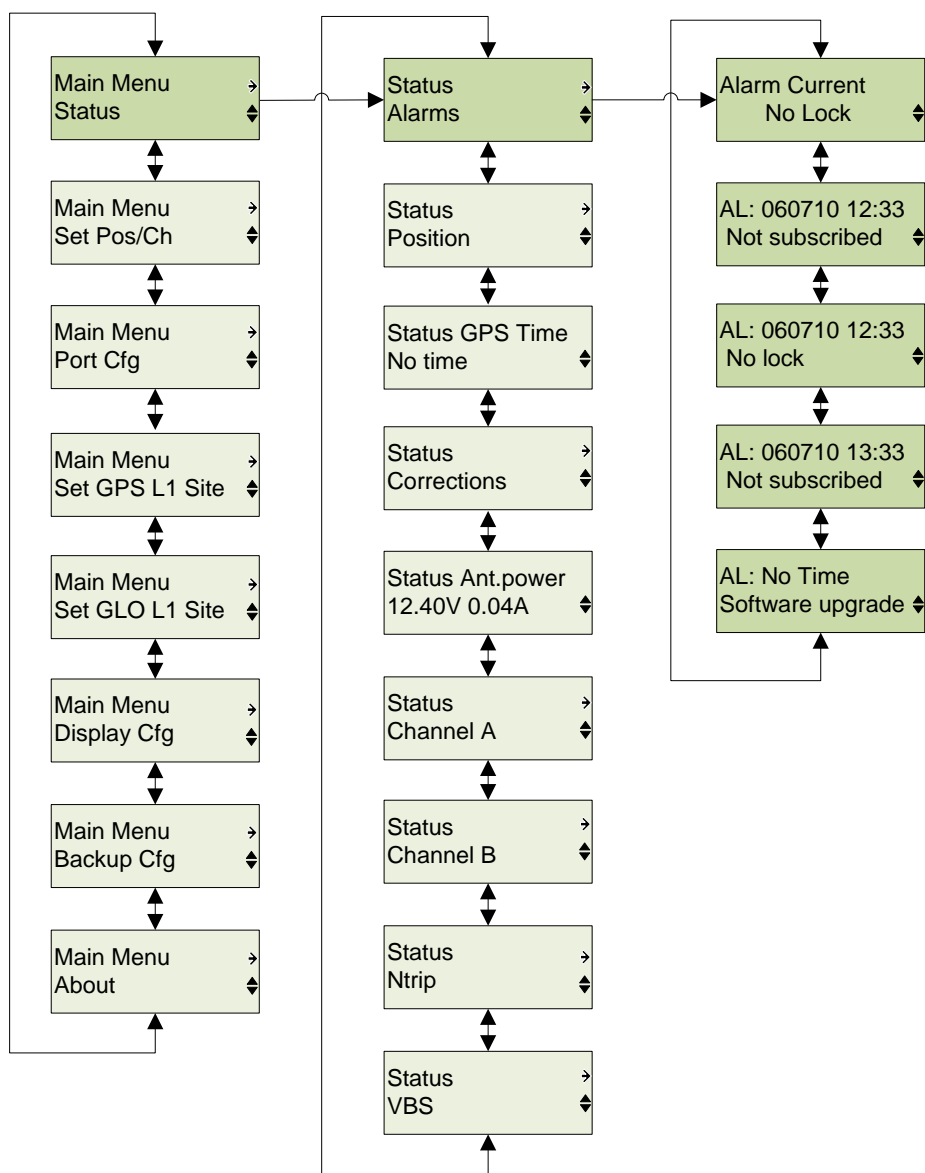
Status menu - NTRIP



Status menu - VBS

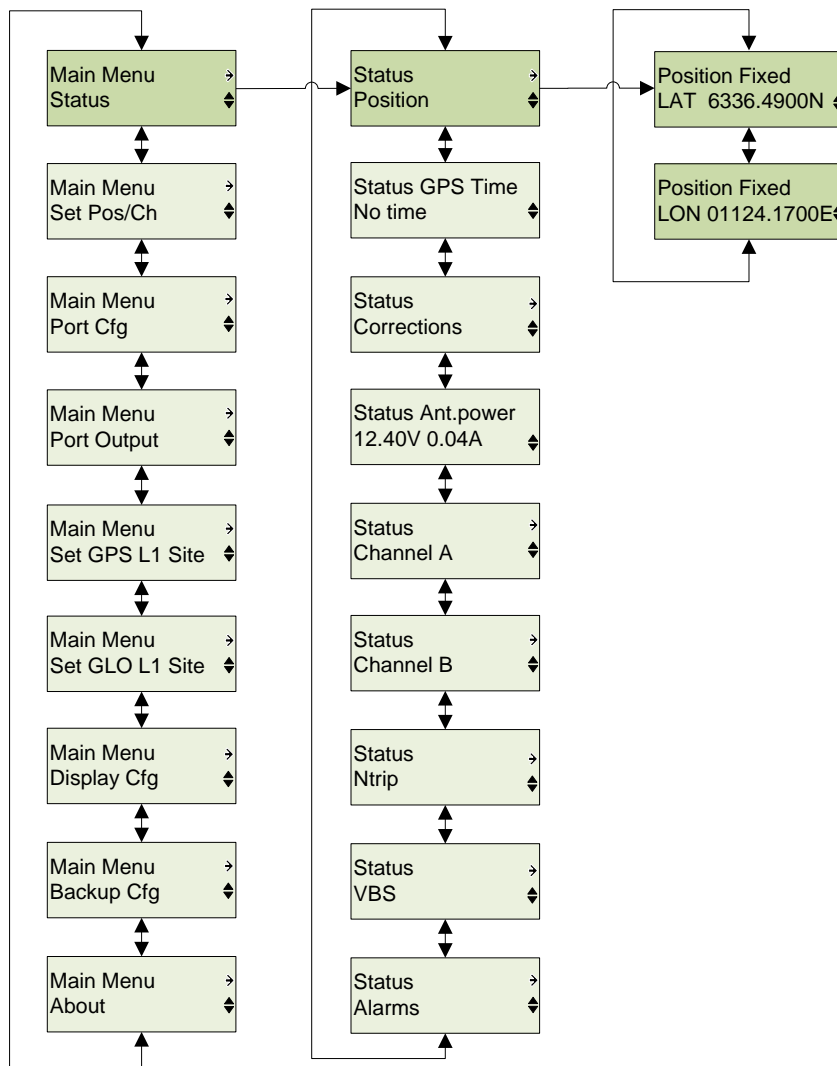
S

Status menu - Alarms

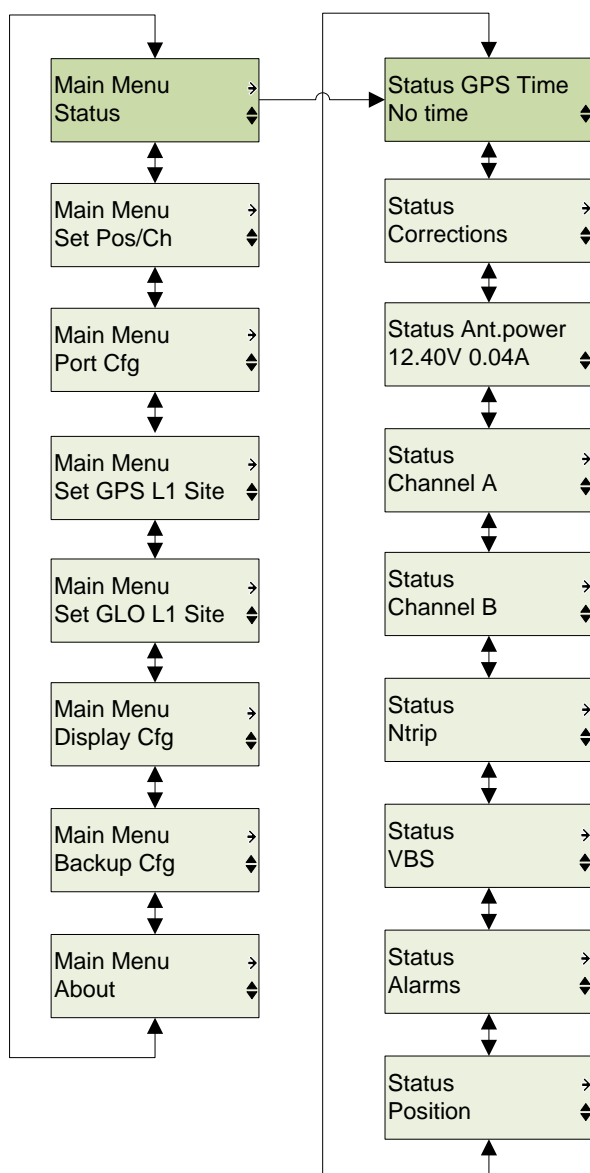


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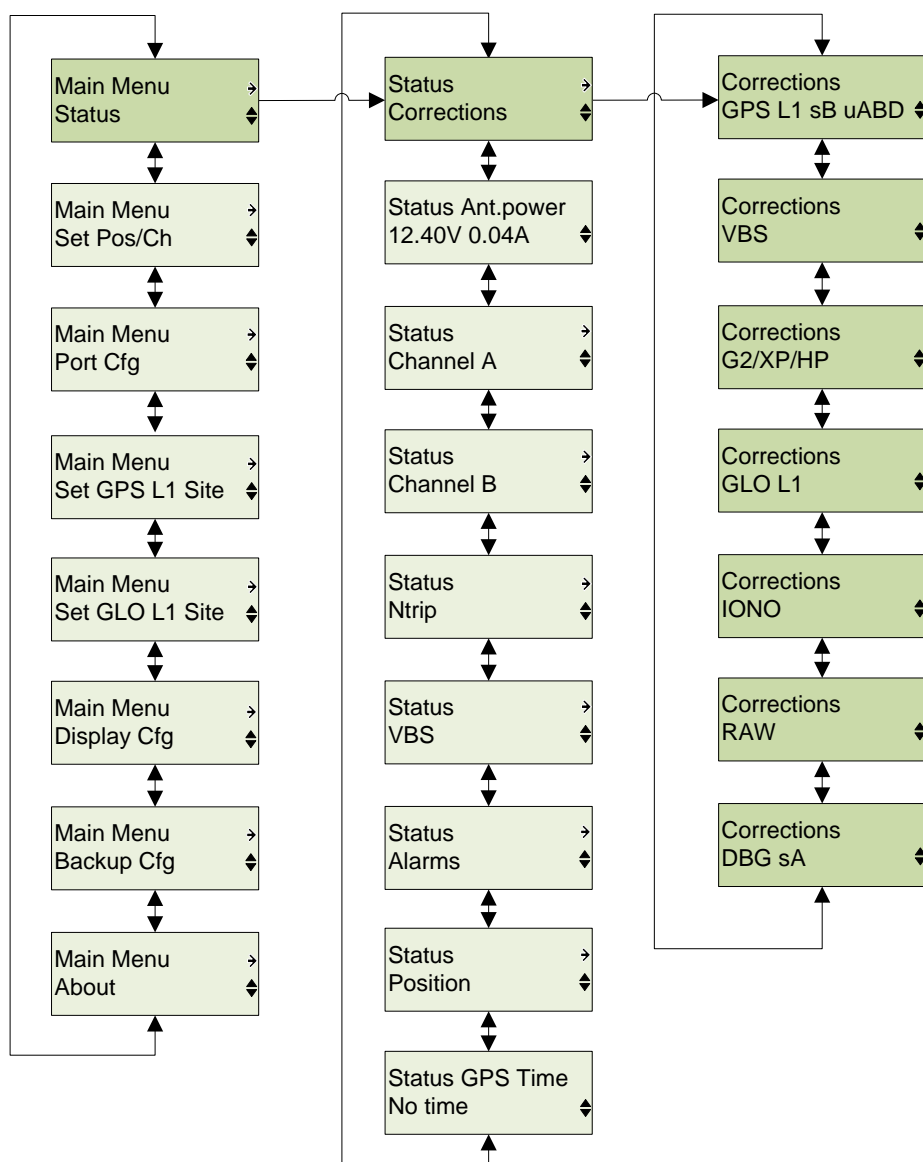
Status menu - Position



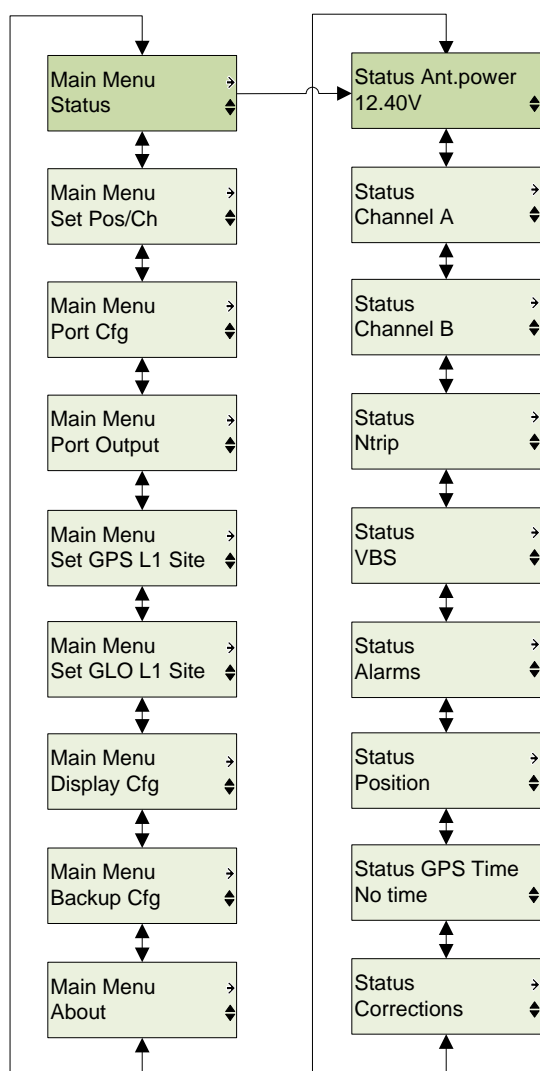
Status menu - GPS Time



Status menu - Corrections

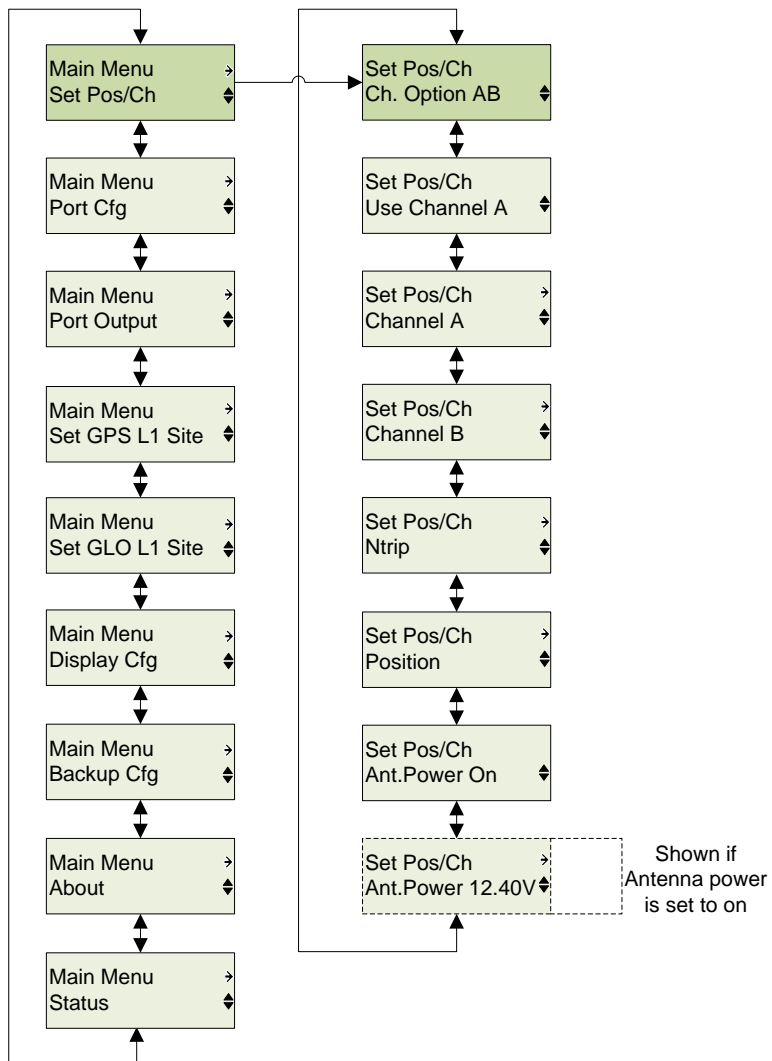


Status menu - Ant. Power

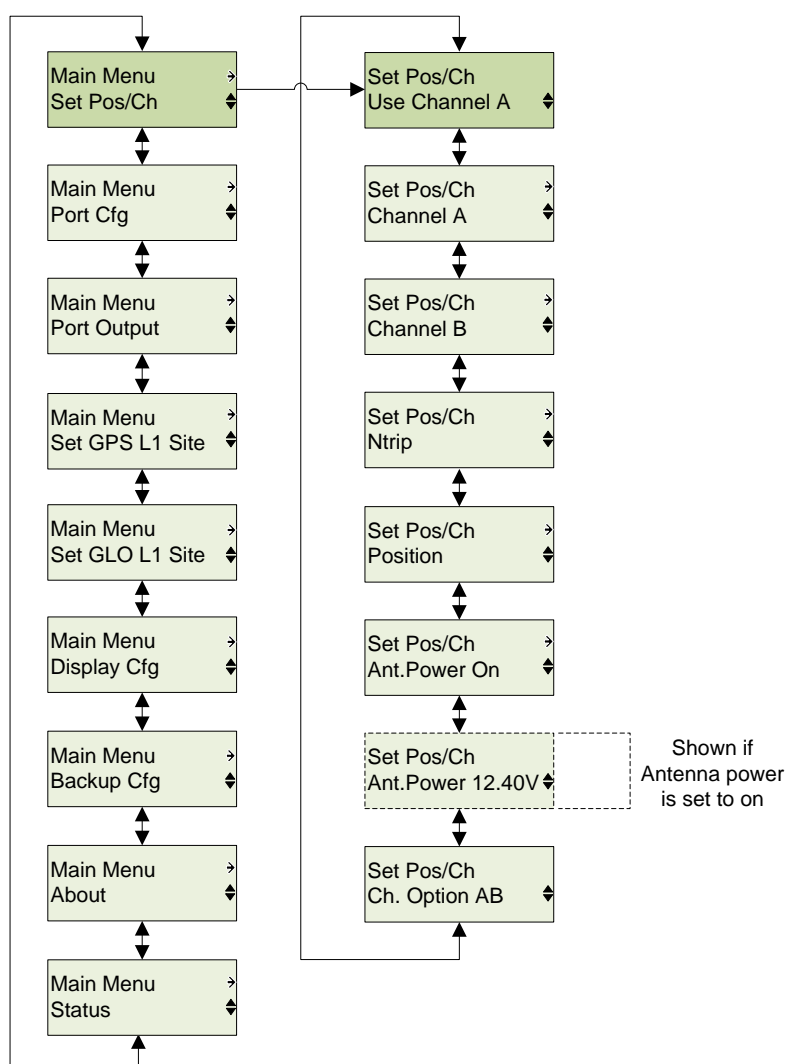


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Set Pos/Ch - Ch. Option



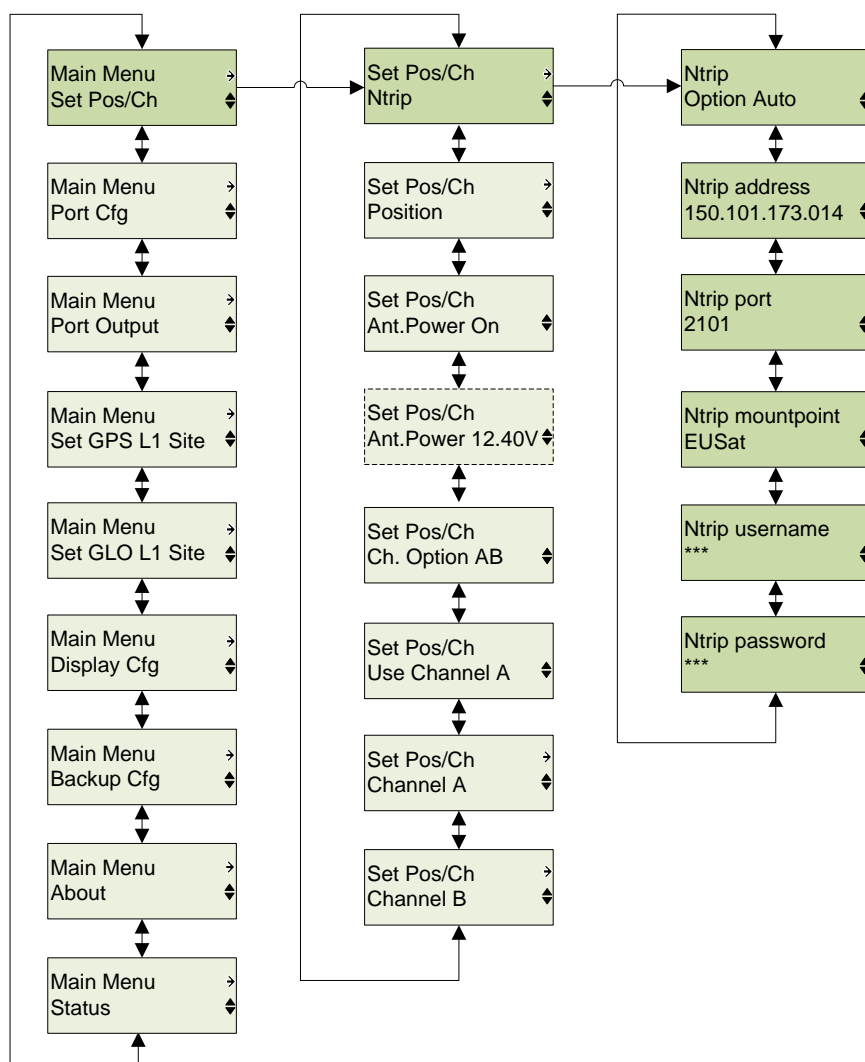
Set Pos/Ch - Ch. Option



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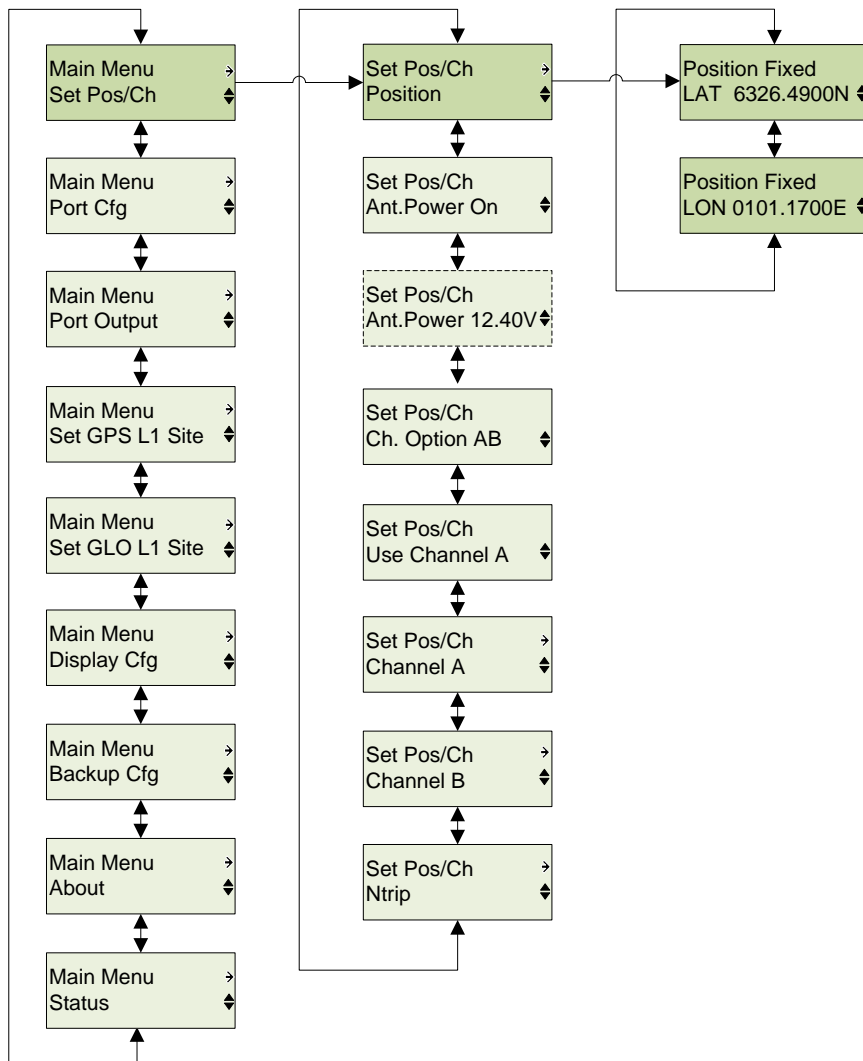


Set Pos/Ch - NTRIP

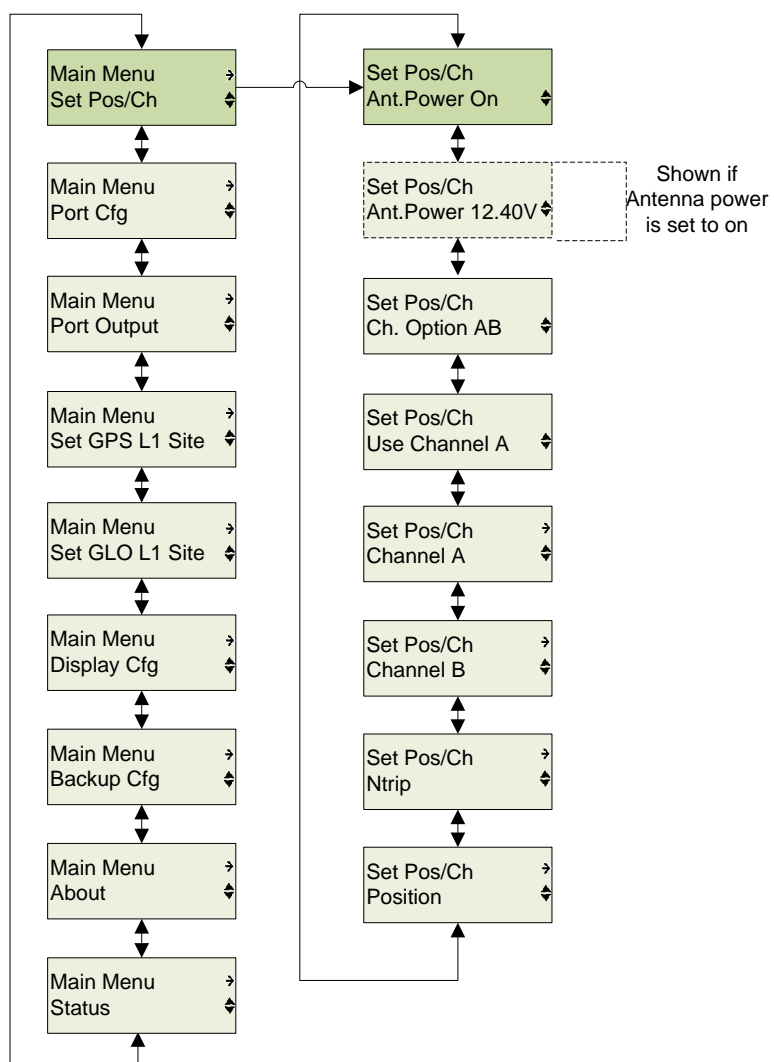


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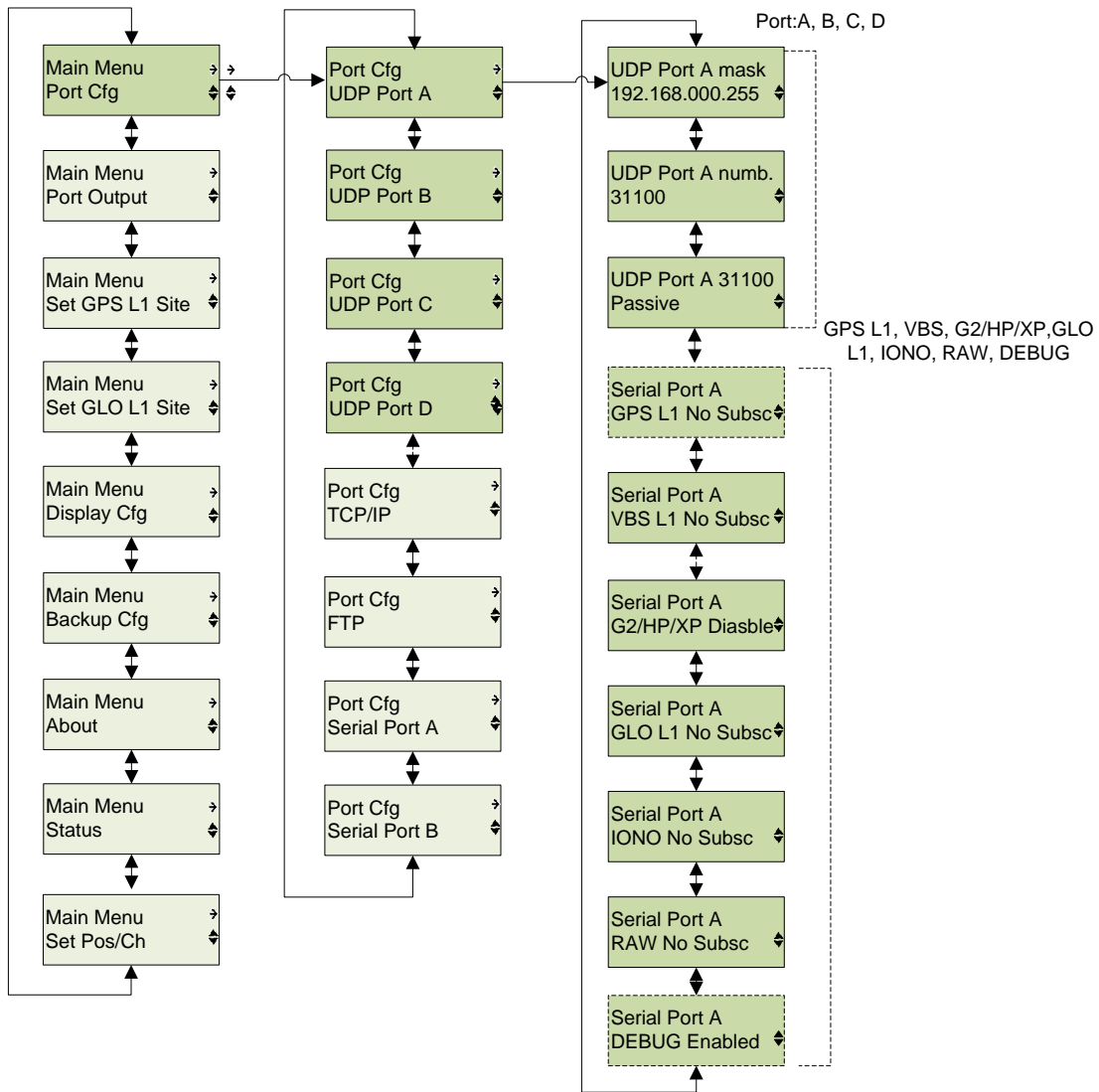
Set Pos/Ch - Position



Set Pos/Ch - Ant.Power

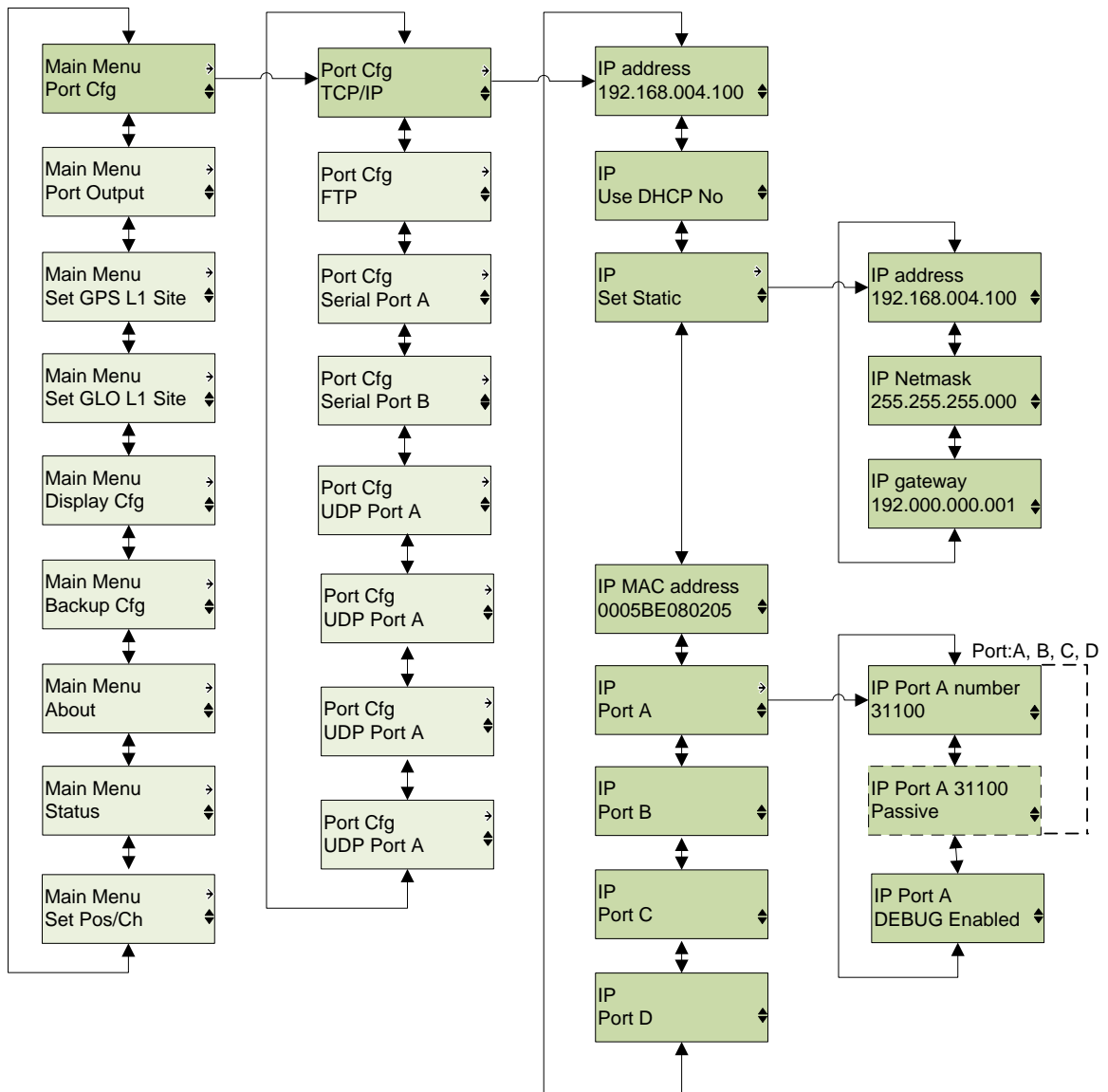


Port Cfg - UDP Port



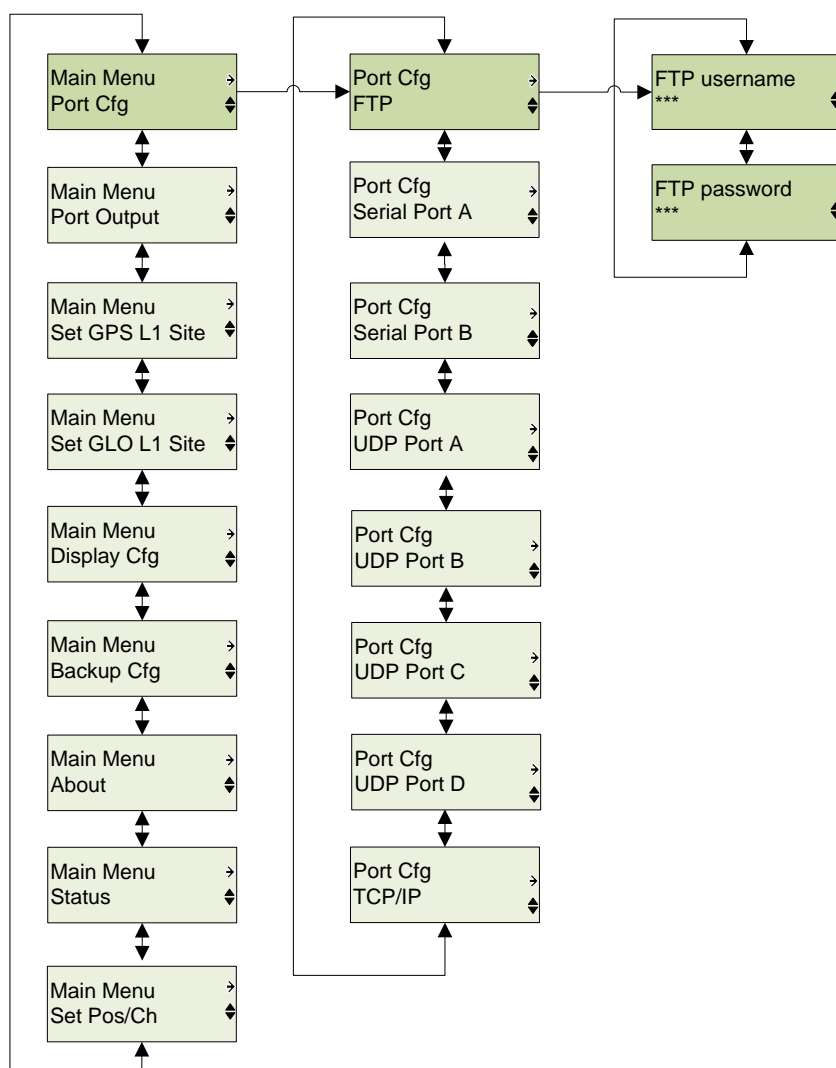
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Port Cfg - TCP/IP



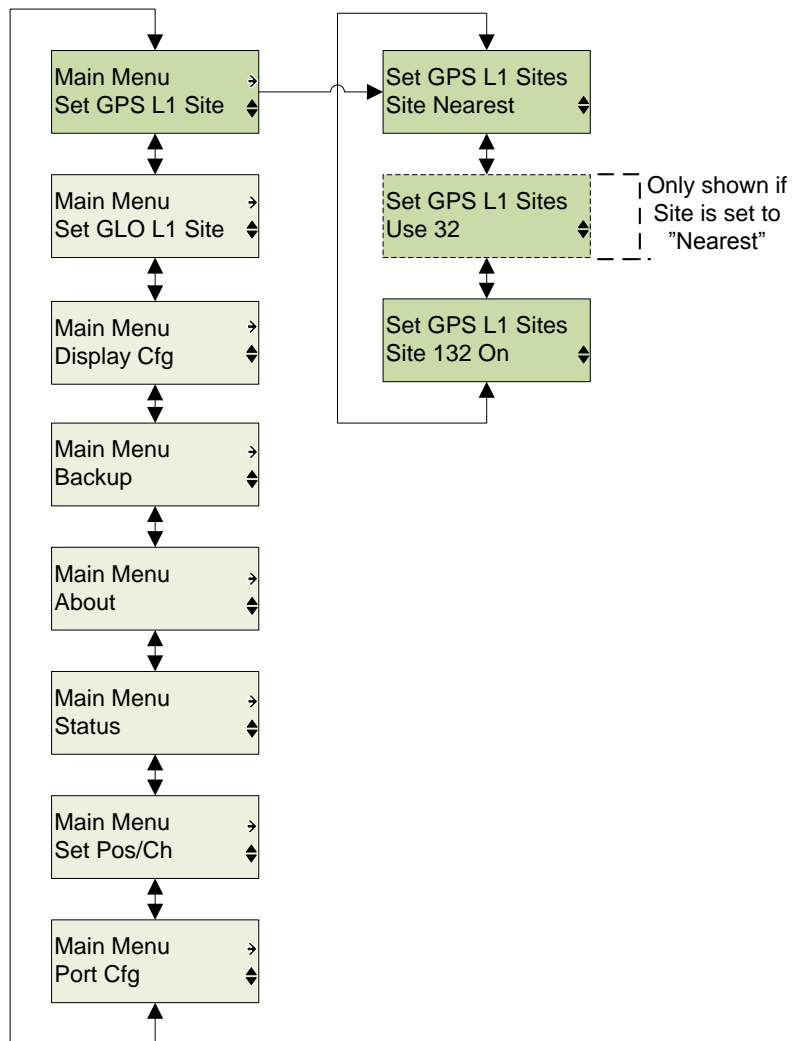
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Port Cfg - FTP

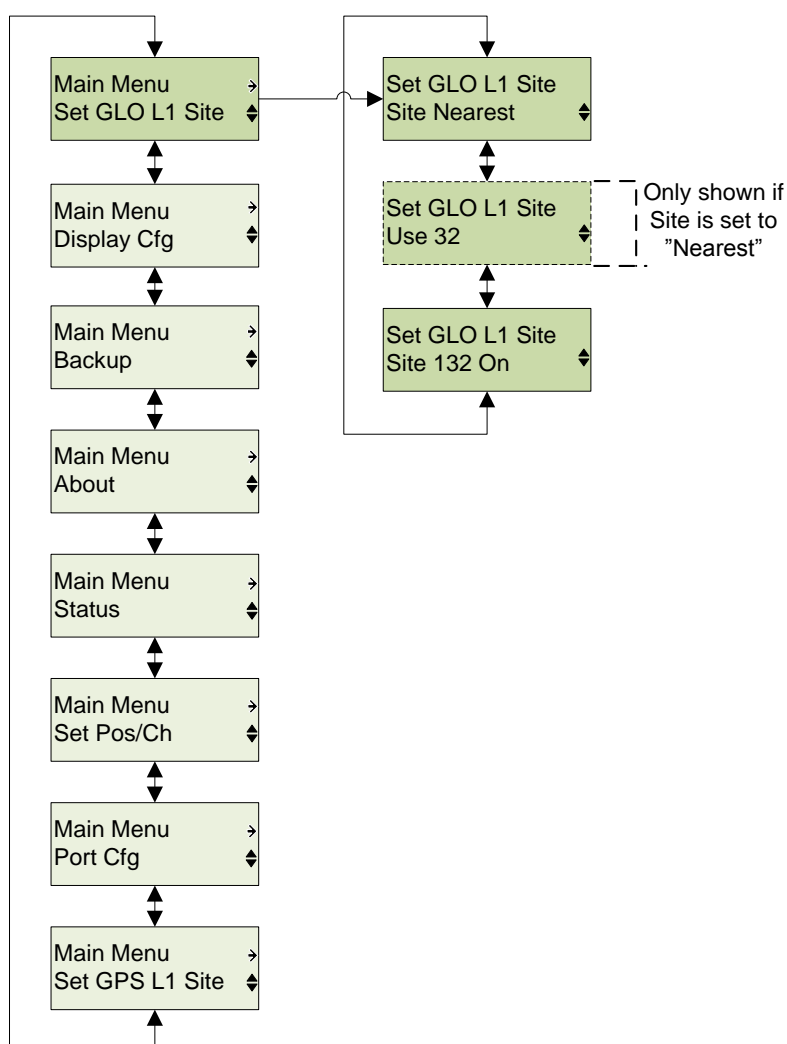


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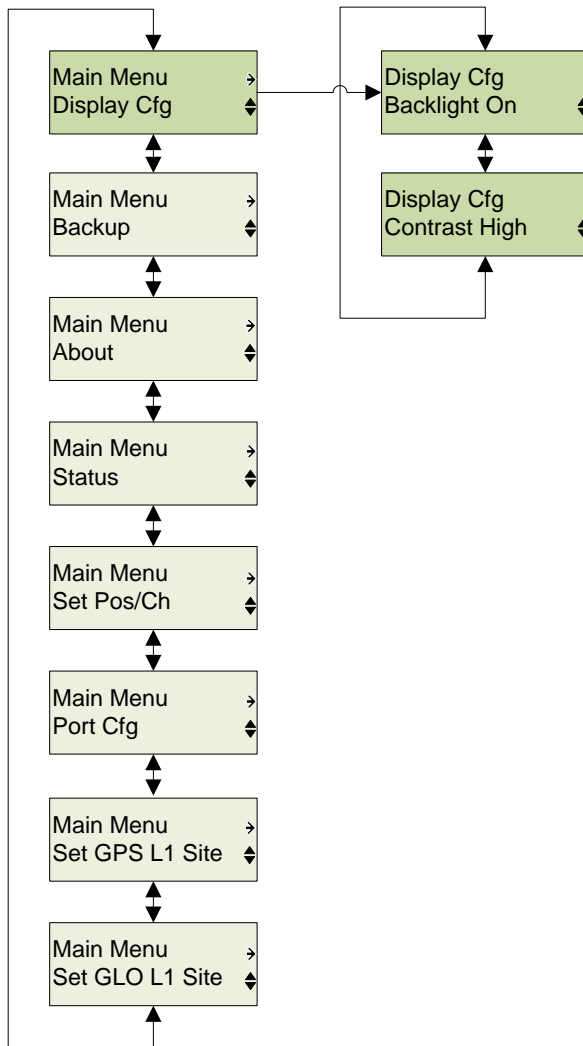
Main menu - Set GPS L1 site



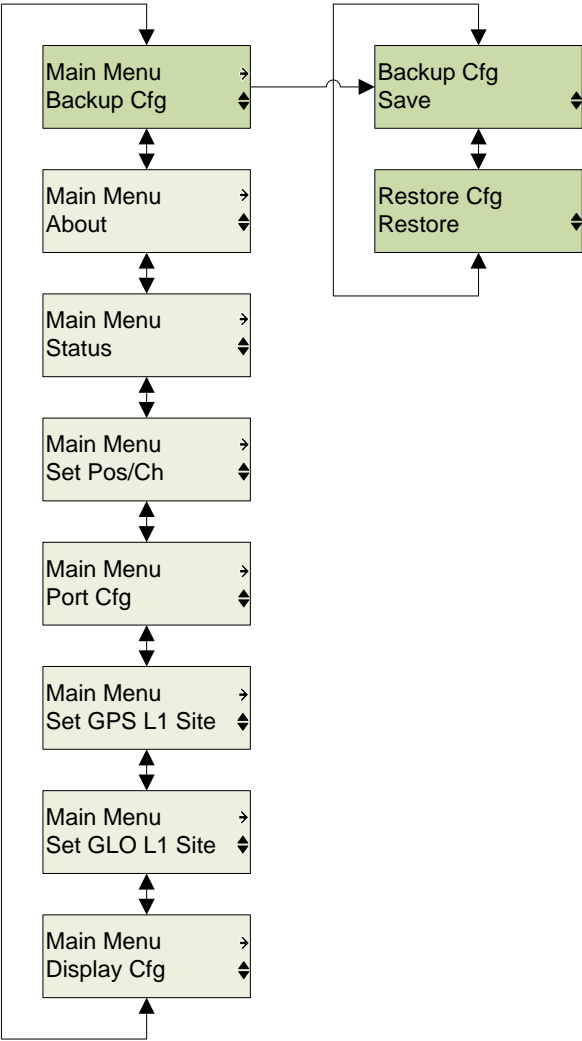
Main menu - Set GLO L1 site



Main menu - Display Cfg



Main menu - Backup Cfg

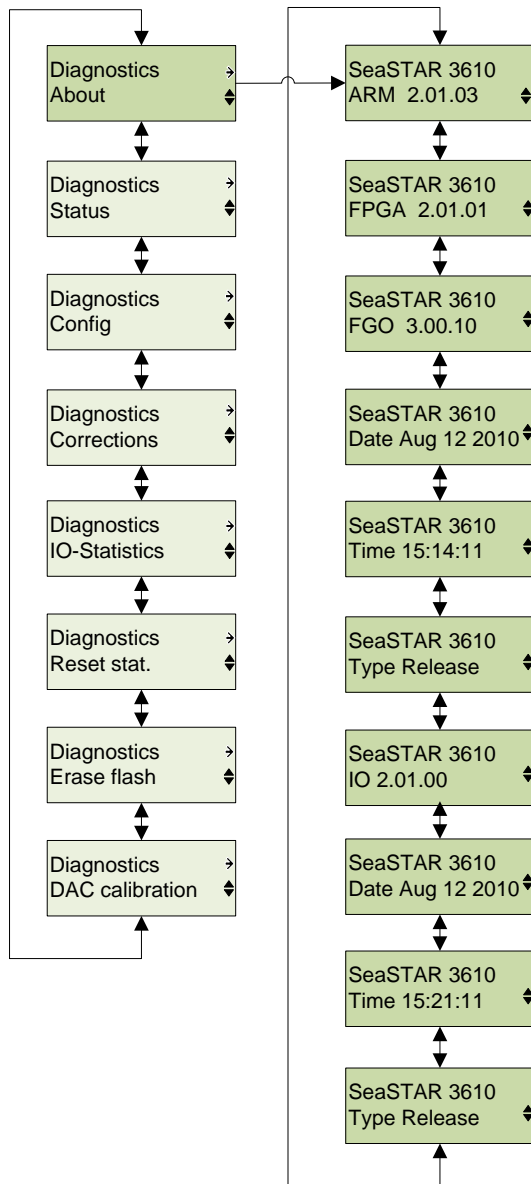


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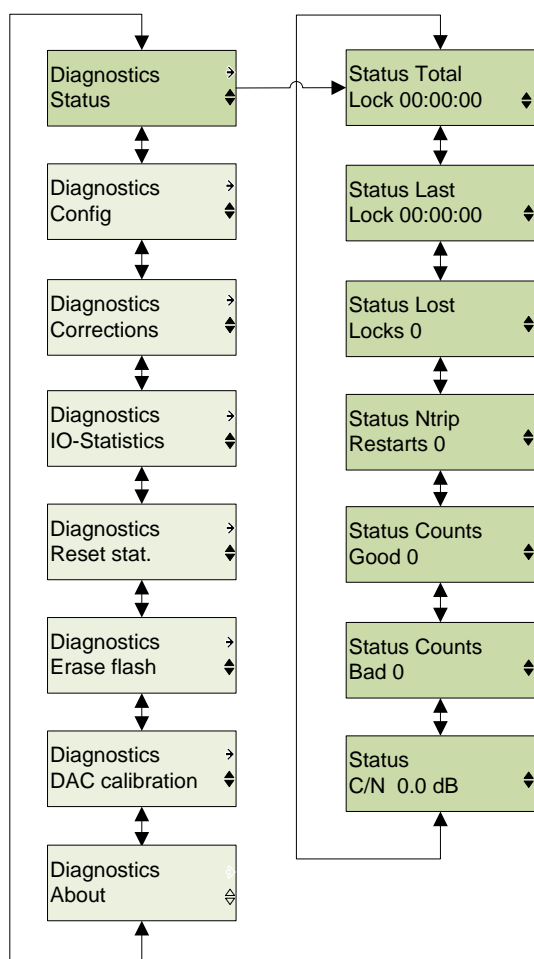
APPENDIX F – DIAGNOSTIC MENU

This section describes the diagnostic menu structure in the 3610 DGNSS Receiver. It is accessed by pressing ← and → simultaneously, anywhere in the 3610 DGNSS Receiver menu.

Diagnostic menu – About

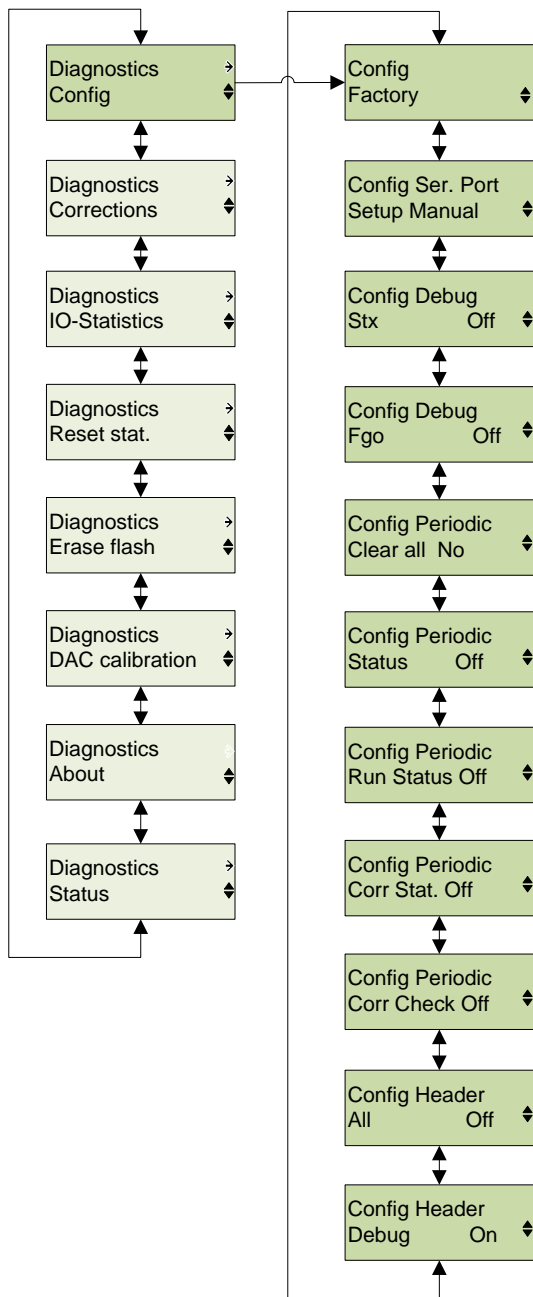


Diagnostic menu – Status

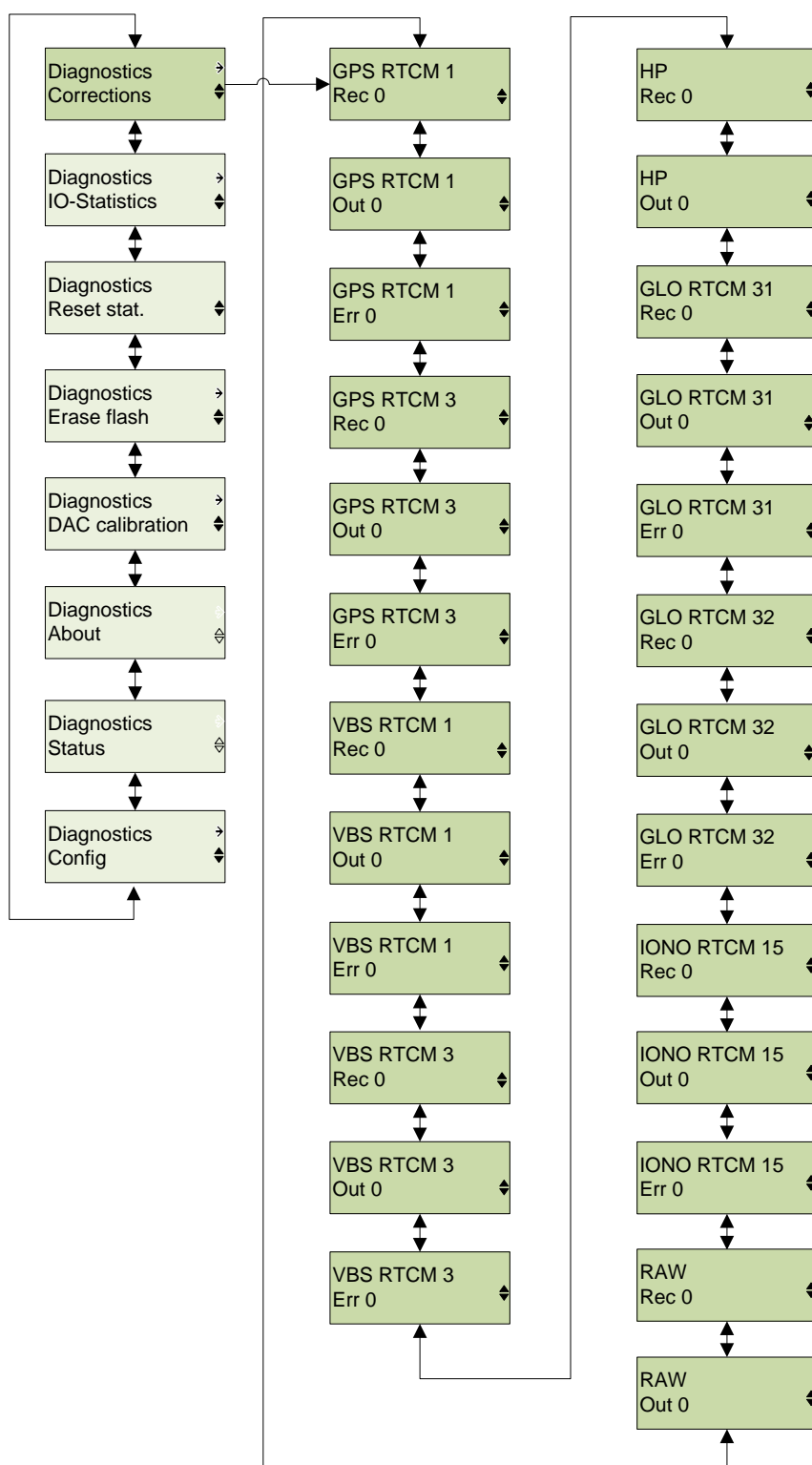


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Diagnostic menu – Config

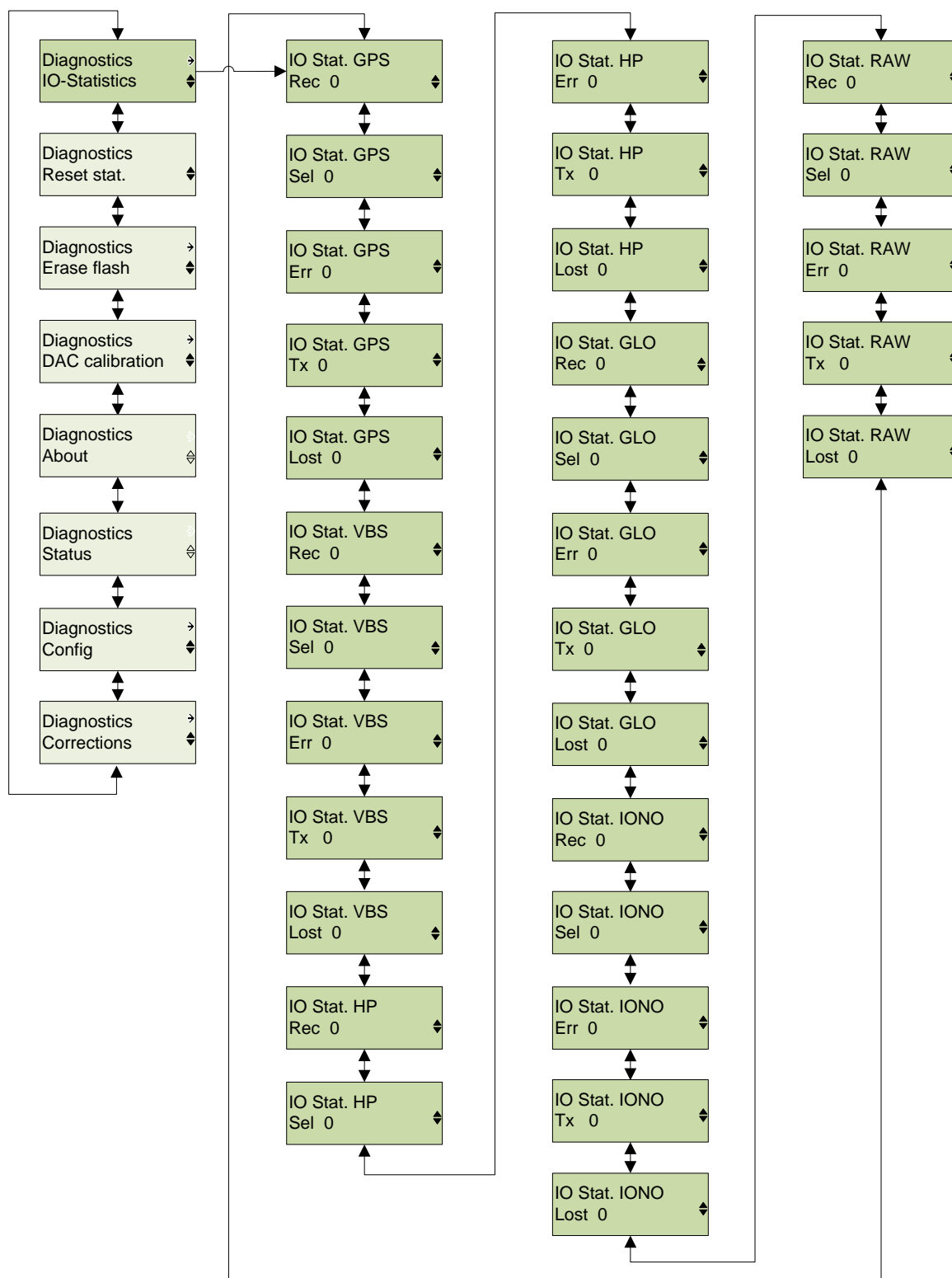


Diagnostic menu – Corrections



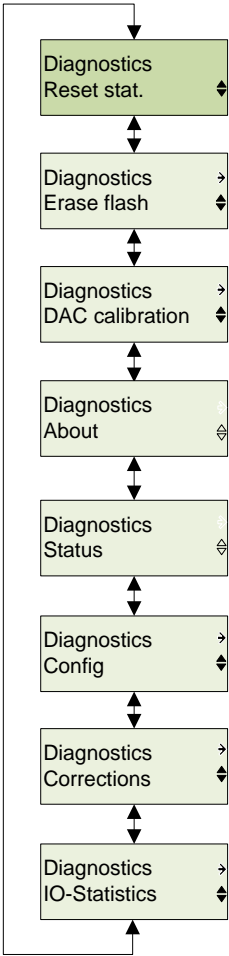
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Diagnostic menu – IO- Statistics



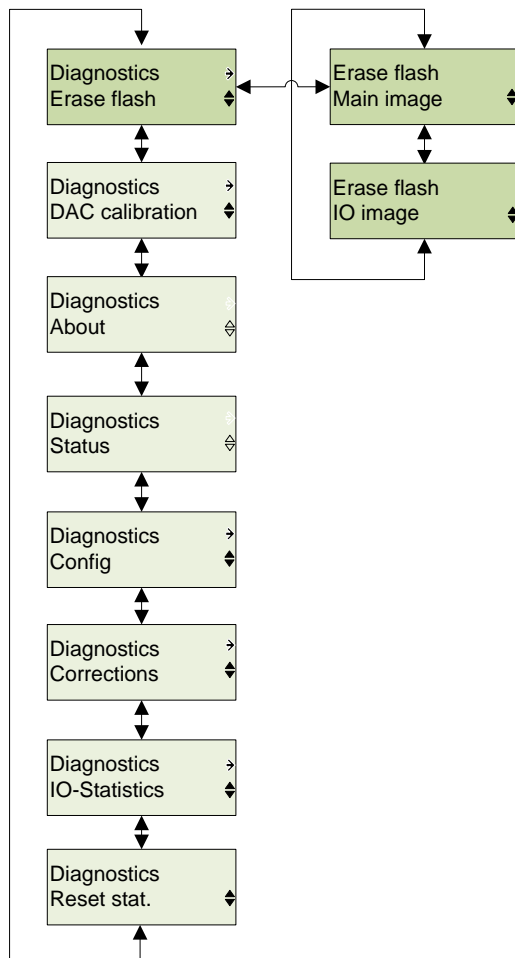
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Diagnostic menu – Reset statistics

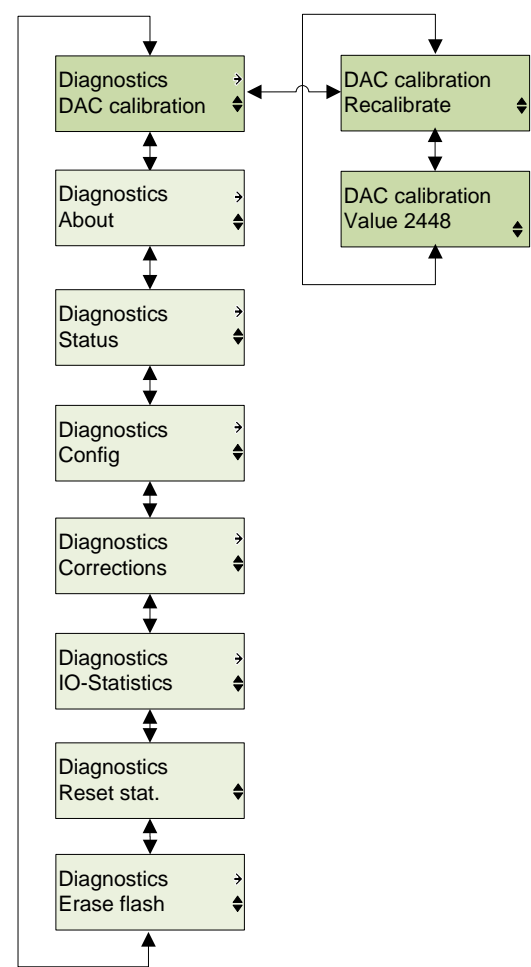


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Diagnostic menu – Erase flash



Diagnostic menu – DAC calibration



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This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

SeaSTAR Customer Support and 24 Hour Help Line

FUGRO SEASTAR AS

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Fax: +47 21 50 14 01

E-Mail: seastarservice@fugro.no

Fugro SeaSTAR®

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